▶ COST CRUNCHING

Users wired for savings

Self-installed wire sidesteps fees.

BY MICHAEL FAHEY
Staff Writer

John Compitello, vice-president for communications at Irving Trust Co. in New York, expects to receive from New York Telephone Co. a refund of more than $300,000 for improperly levied inside-wire charges.

James Bray, network analyst for Arkla Gas Co. in Shreveport, La., will cut his company's network costs by $1 million, in part by avoiding inside-wiring and station message-recovery charges.

Compitello and Bray are among the expanding number of communications managers and executives who are realizing big savings for their companies by carefully analyzing telephone tariffs and company phone bills.

"There is a lot of confusion on the treatment of wiring and Feder-

See **Wired** page 48

▶ ICA WRAP-UP

Lackluster ICA short on pizzazz

BY PAUL KORZENIOWSKI
Senior Writer

ATLANTA — "Disappointing" was how vendors and attendees termed last week's International Communications Association (ICA) annual conference here. At a time when communications products and services are dramatically increasing in number, conference attendance of just slightly more than 300 vendors and 7,000 attendees was lower than anticipated. The attendance numbers were roughly the same as those from last year's show in Dallas.

Attendees yearning for important new products were also let down. Rolm Corp.'s Redwood, enhancements to AT&T Information Systems, Inc.'s System 75 and MCI Communications Corp.'s Prism III were announced as expected, but there were no blockbusters.

Users at the show seemed more concerned with how the Communications Workers Association's strike against AT&T was affecting their companies than with any of

See **ICA** page 6

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 14 JUNE 9, 1986

▶ MICRO-TO-MAINFRAME

Virtual disks emerging

Reliability a hallmark.

BY CAROLE MORTON
Special to Network World

The micro-to-mainframe link industry has spawned a great variety of products — and corresponding advertising — that have created one of the most confusing purchasing environments that an MIS or data processing manager could ever face.

Decisions on data security,

Continued on **page 35**

Morton is president of Sterling Software, Inc.'s Dylakor division.

▶ OFFICE INTEGRATION

Honeywell reaches out

Product barrage backs up promise; firm vows to coexist with office rivals.

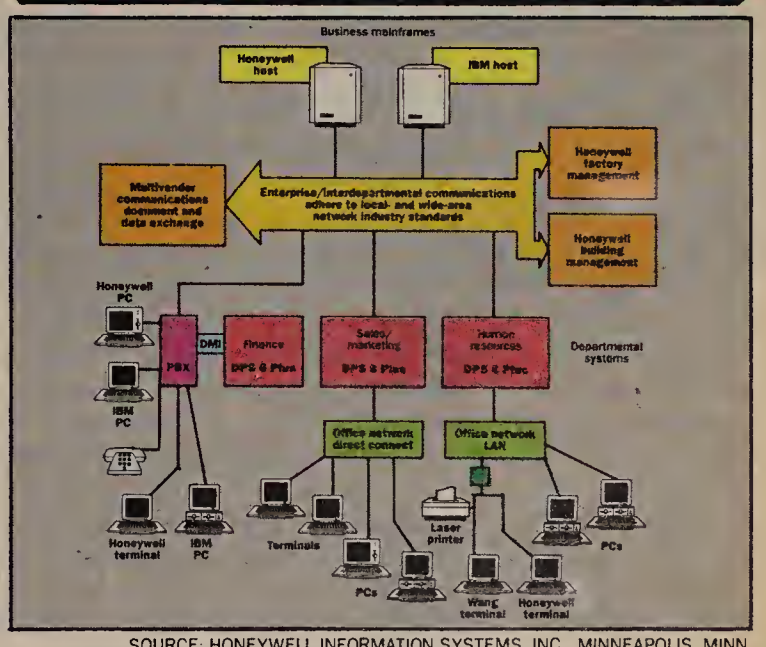
BY JIM BROWN
New Products Editor

NEW YORK — Making good on a four-year-old promise, Honeywell Information Systems, Inc. last week rolled out a barrelful of communications products aimed at helping it grasp a piece of the expanding integrated office systems market.

The move illustrates Honeywell's previously announced strategy of coexistence with rival computer vendors, particularly IBM. It also fulfills Honeywell's 1982 promise to deliver products that allow users to integrate various factory, building maintenance and office automation systems. To date, it has been only moderately successful in the

See **Honeywell** page 49

Honeywell's Office Network Exchange (ONE) architecture



SOURCE: HONEYWELL INFORMATION SYSTEMS, INC., MINNEAPOLIS, MINN.

NETWORK LINE

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Contel Business Networks ousts Centrex in Orange County, Calif., and wins a 10-year, $15-million communications contract. Page 2.

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The communications elite meet for ICA '86 in Atlanta. Having seen the future, they opt for the present. Page 6.

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Chips and Technologies, Inc. is chipping away at the cost of Starlan interface boards. Page 3.

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ITT announces a 21% rate cut that will make long-distance users smile. Page 2.

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150,000 CWA workers continue to picket after union officials' rejection of AT&T contract proposals. Page 5.

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A nationwide network that allows JCPenney telephone sales employees to work at home has boosted morale and productivity. Page 28.

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MasterCard holders know that transactions are quick, but are unaware of the hidden, complex network capabilities behind them. Page 31.

▼

NEWSPAPER

▶ DISTRIBUTED PROCESSING

Data base tool links remote sites

Net performance key to success.

BY BOB WALLACE
Senior Writer

ALAMEDA, Calif. — Relational Technology, Inc. (RTI) last week unveiled a distributed data base management system (DBMS) based on its widely used Ingres relational DBMS that will allow users to access and update data stored on remote processors transparently.

The first release of the Ingres/Star system, scheduled for fourth-quarter availability, will provide users with the capability to update data in a single data base and to

See **Ingres/Star** page 49

▶ LONG DISTANCE

ITT unveils 21% rate cut

USTS long-haul users to benefit.

BY BOB WALLACE
Senior Writer

SECAUCUS, N.J. — In conjunction with last week's International Communications Association annual meeting, United States Transmission Systems, Inc. (USTS), ITT Corp.'s long-distance subsidiary, announced pricing for its long-distance calling services has been reduced by as much as 21%, effective July 1. The company also announced a new Wats service and an option for ITT's Wats services that allows users to bypass local telephone company switches.

ITT Longer Distance and ITT Preferred Calling will be cut an average of 10% each. Rates for ITT's Smart-Wats services and USA 300 services will be reduced an average of 8% and 6%, respectively.

At ICA, USTS introduced ITT Preferred Wats, designed for users with 18 or more Wats lines per location — each with more than 100 hours of monthly calling per line.

Users of ITT Preferred Wats or of ITT's Smart-Wats series of services, must route traffic through a local telephone company switch.

USTS also announced Private Network Option, an ITT Preferred Wats and Smart-Wats option that allows users to be connected directly to the USTS network via dedicated lines. Use of this option will allow users to save an average of 12% per minute off regular Smart-Wats rates. The Private Network Option is available in 42 cities at no extra charge.

ITT spokesman Jay Stuck claimed users of the new ITT Preferred Wats service are billed according to the mileage between the sites where the call is originated and terminated. "The Smart-Wats service users are billed according to the area codes the call originates from and terminates at," he said.

Pricing information for the new Wats service was not given.

▶ FCC

GE-RCA pairing blessed

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — General Electric Co. last week cleared its final regulatory hurdle in gaining Federal Communications Commission approval of its proposed $6.4-billion acquisition of RCA Corp.

The FCC joined the Department of Justice and the Securities and Exchange Commission, which earlier approved the transfer of control of RCA and its subsidiaries to GE.

The final step in the acquisition process is the signing of a contract stipulating how the two companies will be merged, said Bruce Bunch, GE corporate spokesman. The date for the contract signing has not been set, he added.

RCA's shareowners approved GE's acquisition plan, which was unveiled last year, at their annual meeting earlier this year, according to a company spokesman.

The merger of these two electronics firms, with their extensive communications holdings, could pave the way for a new dominant presence in the telecommunications industry — one that approaches IBM in size. No immediate changes in the operations of the communications businesses are expected. But analysts say the marriage could have some long-term consequences, especially in consumer-oriented communications.

"GE's request for the transfer of control of RCA is somewhat routine in terms of the various communications businesses involved," said Alan Glasser, of the FCC Mass Media Bureau. "But the thing that makes it extraordinary is the value of the transaction — $6.28 billion," he said. The deal was originally valued at $6.28 billion, but was upped to the final figure of $6.4 billion.

The FCC received only a handful of petitions to deny GE's bid to buy RCA. Most of those petitions concerned the two firms' broadcast interests, such as RCA's NBC television network.

One petitioner complained that the merger would create a conflict in the data communications area. Wilbert Tatum, chairman of the *New York Amsterdam News*, a New York newspaper, said the deal would violate the Communications Act of 1932, which prohibits the merger of a domestic telegraph carrier and an international carrier.

The FCC responded that GE subsidiary General Electric Information Services Co. (Geisco) cannot be considered a telegraph carrier because it is a specialized carrier that does not offer telecommunications services to the general public, Glasser said. In addition, current regulations have allowed the merger of international and domestic record carriers since 1981.

In approving the deal, the FCC gave GE 18 months to divest itself of five radio stations in New York, Washington, D.C. and Chicago. According to broadcast regulations, a broadcaster cannot own both radio and television stations in the same market. Since NBC has television stations in those markets, GE must divest itself of the radio stations.

GE's primary communications interest is in its Geisco subsidiary, which offers value-added networking, network application processing, electronic mail, telegraph service and software delivery. Geisco has a subsidiary called Software International Corp., which markets financial applications software.

GE also has a joint venture with Ungermann-Bass, the local-area network vendor, called Industrial Networking, Inc. (INI). INI develops and markets local networks for the factory environment.

RCA Global Communications, Inc. is an international record carrier that owns and operates satellites for the provision of telex and other communications services. RCA Americom is a domestic telecommunications carrier. RCA Cylix is a packet-switching network.

▶ CONTEL BUSINESS NETWORKS

Contel unit wins $15m contract

Centrex ousted in Orange County communications deal.

BY SHARON SCULLY
Senior Editor

ATLANTA — Southern California's Orange County Board of Supervisors last week said it has voted to replace its Centrex system with a $15-million telecommunications system from Contel Business Networks (CBN), a division of Contel Corp. here. The 10-year contract also calls for CBN to provide management, maintenance and support services for an additional undisclosed fee.

After 30 months of study, the county's board of supervisors voted unanimously to award the contract to Contel. The contract calls for a 10,000-line Northern Telecom, Inc. SL-100 digital central office to be linked to 25 Northern Telecom SL-1 digital private branch exchanges and 25 microwave links. Unsuccessful bidders included Centel Business Systems in Chicago, which also bid a Northern Telecom system, and GTE Business Communications in Phoenix.

According to Tom Davidson, director of sales for CBN, the county chose CBN's $15.3-million bid over Centel's bid of $16.4 million and GTE's $21.3-million proposal. He said an initial round of bidding resulted in the elimination of several other systems integrators, including AT&T Information Systems, PacTel Information Systems and Pacific Bell, the latter two of which are both subsidiaries of Pacific Telesis Group.

Davidson said the county put unusually heavy emphasis in evaluating the proposals on what he called "stability and growth capacity." The turnkey system CBN will install, he said, will have a 560% expandability factor when it is cut over in August 1988.

"The county is buying stability," said Roger Nill, the CBN account executive who has worked on the deal since August 1981. "It was very important to them to know that I had been involved in the deal

See **Contel** page 48

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▶ STARLAN NETS

Chip set chips away at interface cost

BY MARY PETROSKY
West Coast Correspondent

MILPITAS, Calif. — Chips and Technologies, Inc. last week introduced a chip set that promises to drastically reduce the cost of network interface boards that tie microcomputers to Starlan-type local-area networks.

Jeff Grammer, sales development manager for Chips and Technologies, said the two-chip set could allow vendors to develop Starlan-compatible network boards that cost as much as $400 less than AT&T's $595 Starlan interface boards. Grammer said Starlan interface boards could be manufactured for less than $200.

Besides providing for less-expensive Starlan-compatible hardware, one of the new chips could be used on Ethernet network boards to provide an interface to Starlan, he said. Configured with the Chips and Technologies chip, the board could only be used as a Starlan interface, however.

Manufacturers of Ethernet boards could offer the Starlan interface on a daughter board that would connect to their Ethernet board, Grammer said. While such an approach would enable vendors to provide Starlan-compatible components quickly, the cost advantage would be diluted.

Chips and Technologies' 82C550 Starlan Serial Interface replaces about 60 discrete board components currently used in Starlan implementations, and the second chip, the 82C551 Starlan Hub Controller, replaces 80 discrete components. Both chips are compatible with IEEE 802.3 Starlan draft specifications, according to Grammer.

The hub controller chip could help bring down the cost of the controller used in Starlan-compatible networks to tie together separate clusters of micros. AT&T calls the controller a Network Extension Unit and prices it at $575.

The Starlan Serial Interface is available for $15.60 in sample quantities of 100. The hub controller is priced at $56.70 in quantities of 100.

The costs of chips in the 802 arena have come down because 802 has been a standard for so long, said Lee Doyle, senior communications analyst at International Data Corp., Framingham, Mass. Starlan is actually a subset of the 802.3 standards, and it is a standard because it conforms to 802.3, Doyle said.

Starlan operates at 1M bit/sec, as opposed to the Ethernet-type network's 10M bit/sec. "I don't think speed is a major issue in connecting PCs in a small network; price is," Doyle said.

Although AT&T won't reveal how many Starlan networks have been installed since the network began shipping in April, the company claims it currently has back orders for 2,000 nodes.

▶ RATES

AT&T cuts take effect

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Owing to eleventh-hour approval by the Federal Communications Commission, AT&T Communications, Inc.'s recent $2-billion long-distance rate cuts took effect June 1.

In addition to blessing AT&T's rate parings, the FCC gave the green light to the National Exchange Carrier Association's lower local-access rates, which also took effect June 1. Local exchange carriers charge long-distance companies the local-access rates for connection to the customer premises. These rates figure into the long-distance rates of AT&T and its competitors.

Along with the FCC-approved rate cuts, AT&T is proposing an additional $48 million in net local-access price decreases for such business services as Wats and 800 Service, according to documents filed recently with the FCC. Those additional rate changes reflect proposed decreases in Wats and 800 service as well as increases in private-line rates.

Also on June 1, new local-carrier customer-access line charges went into effect. End-user charges for residential and single-line business customers increased from $1 to $2, while Centrex line fees increased from $2 to $3. For most users, the increases will be offset by the decline in long-distance rates.

The FCC stated that these rate changes, in addition to earlier reductions, resulted in part from the FCC's access charge program in which the cost of the local telephone network operations has been shifted directly to end users.

The rate cuts will give AT&T customers an average 11.3% cut in long-distance rates. AT&T's Message Toll Service rates will be reduced by 11.8% overall and Wats rates will drop by up to 15.2%.

▶ IBM

New Series/1 minis out

BY MARGIE SEMILOF
Senior Writer

RYE BROOK, N.Y. — IBM last week announced new models of the Series/1 minicomputer, which the company is targeting for use in departmental data processing, industrial automation, transaction processing and communications processing applications. IBM also released enhancements to Series/1 software products that, among other things, are designed to increase the machine's Systems Network Architecture support.

The newly unveiled IBM Series/1 4956 G10 and H10 processors each incorporate a 40M-byte, 5¼-inch disk drive and a 12M-byte diskette drive. The processors are based on the currently available Series/1 Model B10 and E10 processors. The G10 and H10 feature main storage memory of 1M byte, expandable to 2M bytes in the E10. The G10 sells for $16,500 and the H10 for $18,500. IBM also unveiled the desktop Series/1 5170 model 496, which consists of a Series/1 microprocessor and a six-port terminal attachment card housed within an IBM Personal Computer AT.

The software announcements included a new release, Version 5.2, of the Series/1's Event-Driven Executive multitasking operating system that provides additional device support and programming functions. Also introduced was an upgraded release, Version 1.2, of IBM's Series/1 EDX Remote Manager that allows users to control Series/1 processors from communications and systems management programs on IBM host processors. The enhancements support full-screen operation, provide improved systems management functions and determination support for additional Series/1 devices.

IBM also debuted Version 2 of its Series/1 EDX SNA, which provides support for up to four SNA lines per Series/1 processor. The new release supports an expanded number of active SNA logical units and added flexibility in system definition. The IBM Series/1 Realtime Programming System Version 7 features enhanced primary SNA support and additional network management capabilities.

EDX pricing ranges from $750 to $5,500. EDX Remote Manager Version 1.2 costs $2,000, with a monthly charge of $133. EDX SNA Version 2 is priced at $2,500, and the Realtime Programming System Version 7 is priced at between $7,000 and $12,500.

The EDX Transaction Processing System Version 1.2 costs $2,950. The EDX Indexed Access Method Version 2.1 is priced at $1,150.

NETWORK WORLD

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"ABC membership applied for"

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▶ VSAT NETWORKS

Reuters requests ruling

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Reuters U.S., Inc., the American subsidiary of the U.K.-based news service, recently asked the Federal Communications Commission to clarify its current regulations, which allow only common carriers to own and operate international very small aperture terminal (Vsat) networks.

Reuters, which wants to implement such a Vsat network, has asked the FCC to handle its request for a declaratory ruling as a precedent-setting case. The company wants the case to establish guidelines for non-common carriers seeking to operate transmit/receive Vsat networks that communicate with Intelsat Business Service satellites, according to James Ball, division chief of the International Facilities Branch of the FCC.

Current FCC guidelines allow licensed common carriers to own and operate two-way Vsat networks used in conjunction with Intelsat international communications satellites. But the FCC regulations are unclear about whether non-common carriers may do so as well.

In filings with the FCC, Reuters officials argued that although the 1962 Communications Satellite Act does not give the FCC authority to license private, non-common carrier Vsat networks for operation with the Intelsat system, it does not bar such licensing.

Reuters said in its FCC filing that its international communications traffic is heavy enough to warrant the construction and operation of a private, dedicated Vsat network in the U.S. This network would receive and transmit data for its bureaus and subscriber news services. Considering the volume of its data traffic, Reuters said that leasing earth station capacity from a common carrier is not economical.

Officials of the news service also argued that the FCC permitted both common carriers and non-common carriers to offer transponder space on various satellite systems. The officials said that the next step for the FCC should be to license non-common carrier international Vsat nets.

Reuters said its current traffic volume justifies the lease of full-time Intelsat satellite circuits from Communications Satellite Corp., the U.S. signatory to the Intelsat consortium. The international news service currently owns and operates Vsat facilities in Hauppauge, N.Y., for U.S. and transborder communications.

▶ LABOR

AT&T strike puts few on hold

CWA claims AT&T is posturing for Wall Street.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Some 150,000 members of the Communications Workers of America (CWA) took to the picket lines last week after union officials failed to reach a contract settlement with AT&T. However, counterparts of the CWA members in the International Brotherhood of Electrical Workers (IBEW) successfully wrapped up their negotiations with AT&T. The IBEW tentatively accepted a contract offer similar to the one rejected by CWA members.

Roughly 55,000 AT&T managers and some 3,000 newly hired workers have taken the places of striking union members at operator and other positions. The strike has had little impact on basic telephone service. Most of AT&T's network is automated, with computers routing the calls. Equipment manufacturing and installation will be affected by the striking workers, although most observers say equipment, such as PBXs, is usually ordered several months in advance and delivery will not be seriously affected by strike-related delays.

At the close of the scheduled negotiations on May 31, CWA called a strike, which began June 1. The CWA rejected AT&T's 8% wage increase proposal, claiming that AT&T, as an industry leader and a highly profitable company, could better reward its rank and file. Union officials cited a 33% wage increase awarded to top AT&T management this year.

Top union and AT&T negotiators have been meeting informally since the strike began to try to iron out

See **Strike** page 49

▶ ROLM

Users group holds sway

Influences customer support agreement.

BY NADINE WANDZILAK
Staff Writer

ATLANTA — You know you've got clout when a major private branch exchange manufacturer revises its customer support maintenance agreement along the lines that you, a group of users, have proposed.

In this case the "you" is the national Rolm Users Group (RUG).

The national group grew out of an informal meeting of Rolm Corp. equipment users at an ICA show two years ago, according to the group's first president, Stephen Lunsford. Systems problems fostered its formation, he said. Some users were frustrated with the support, or the unevenness of the support, from the company, added newly elected President Charles Garrison.

Both Garrison and Lundsford emphasize that the purpose of the group is not to be antagonistic toward Rolm.

"We believe in Rolm equipment," Lunsford said. "But we know that sometimes we could help the company. As users, we know the equipment sometimes better than they do. We work with it seven days a week.

"We formed because we understand that little is accomplished by throwing stones," Garrison stated. "More is accomplished through a positive, open relationship. That's why we have a resolution process."

Via the groups resolution process, an RUG committee reviews all problems submitted by users and tries to resolve them at the local level before going to corporate channels. The objective is not to circumvent contact between a customer and Rolm, Garrison said, but rather to present selected issues to Rolm.

Another purpose of the users group, they said, is to foster communications between users and the manufacturer. The group might suggest, for example, that a new feature would make a piece of equipment more useful.

"One thing that a telecom manager doesn't like is surprises," said Lunsford, who is manager of the voice network for First Tennessee Bank of Memphis.

By surprises, Lunsford means reading about a new Rolm product before he has heard about it from the company. Out of respect for that attitude, Rolm now sends the group press releases at the same time they are released publicly.

Garrison is proud that Rolm's customer service maintenance agreement has been rewritten very much along the lines that the Midwestern Rolm Users Group had proposed. The issue arose because users in the Midwest, including Garrison, were frustrated by the lack of technical support from Rolm.

When first confronted with complaints about poor customer service, Rolm's regional office stonewalled, according to Garrison.

"They said, 'Here's your contract. This is it,' " he said. "It was all for Rolm; nothing covered the customer."

The Rolm Users Group got corporate connections in Rolm involved in the issue. Eventually, Rolm announced a newly revised agreement. The changes make the agreement easier to implement and are expected to improve customer acceptance and satisfaction.

Much of the language has been clarified to improve readability, and items that were perceived to be vague or ambiguous were eliminated, easing negotiations and possible disputes. The new agreement is intended to be more customer-oriented and easier to administer.

ICA from **page 1**

the new products that debuted. Attendees who expected AT&T Chairman James E. Olson to shed any light on the week-old strike or on AT&T's recently unwrapped reorganization plan were also disappointed. Olson's keynote speech focused more on the show's theme, "Telecommunications: A Strategic Asset," than on any of the specifics of AT&T's unfolding strategy.

During an AT&T-sponsored luncheon on Monday, Richard Holbrook, AT&T senior vice-president of sales, explained the reorganization to ICA members. Holbrook promised that by the end of the year, the communications company would complete the reorganization process so users would have to deal with just one AT&T salesman rather than two. Holbrook emphasized that the reorganization was aimed at making it easier for AT&T to supply its large customers with the goods and services they need.

Holbrook surely would have been disappointed with users' reaction to his speech. Attendees openly scoffed at the promises and doubted that service would improve.

As if to cap off the disappointment, even the show's theme lacked punch. The term "strategic asset" has been bandied about for more than two decades. However, the term has traditionally been applied to computers and software. As corporate networks have become more important and the options available for designing such networks have increased geometrically, the term has been used for communications technology.

But the phrase strategic asset does not have a clear definition. Some users interviewed at ICA thought a strategic asset involved nothing more than a network that cut current telecommunications costs or increased user productivity. One manager proudly pointed to the installation of a voice mail system as an example of a strategic application.

In his keynote address, Olson stated that a strategic application must do more than cut costs. The application should alter the way that a company interacts with its customers. American Airlines' Sabre reservation system, often cited as the best example of a strategic application, automated many functions that travel agents had been doing manually. The system was also designed to display American Airlines' flights before competitors' offerings, a situation that helped to increase American's bookings.

Some communications managers did supply examples of strategic applications. Libbey-Owens Ford Co. in Toledo, Ohio, sells glass to automobile manufacturers. A few years ago, the company installed a direct high-speed data line to General Motors Corp. that enabled the company to order glass directly from Libbey. "We were able to increase market share because our chief competitor could not supply the same service," noted Raymond L. Cowley, Libbey's communications planning manager.

▶ ICA '86

Wats, E-mail services bow

BY JOHN DIX
Senior Editor

ATLANTA — A new Wats service from MCI Communications Corp. and an electronic mail service that ties Western Union Corp.'s Easylink network into IBM messaging systems typified the bread-and-butter services announced at last week's International Communications Association (ICA) meeting here. Contrary to some expectations, there was little mention of futuristic integrated services digital networks.

ICA members are the cream of the communications crop, an elite corps made up of individuals whose companies have annual communications budgets of at least $1 million. If session attendance, booth traffic and coffee break chatter were any indication, ICA members came here looking for answers to today's communications problems and were less interested in tomorrow's technological promises.

The barrage of new services introduced since the divestiture of AT&T is making that search more difficult. There are now more than 300 intercity carriers, AT&T's Richard C. Holbrook told attendees during a session about how divestiture is working. Holbrook is senior vice-president of sales in AT&T's business markets group, a new unit created by the recent reorganization that will sell equipment and services to large users.

As if the current tide of services was not enough, more options are added monthly. Besides the MCI and Western Union announcements at the four-day conference, AT&T announced a family of international digital communications services scheduled to be cut over in 1988, when the TAT-8 transatlantic undersea cable is complete.

MCI's Prism III Wats service joined the company's growing list of business service offerings, which MCI hopes will help it in-

See **Services** page 8

▶ MULTIPLEXERS

Cohesive widens line

BY PAUL KORZENIOWSKI
Senior Writer

ATLANTA — Cohesive Network Corp. announced at the International Communications Association's (ICA) annual conference here last week the second product in its T series of multiplexers.

The Los Gatos, Calif., company's CN-2 is designed to support T-3 transmissions, which work at speeds up to 45M bit/sec. The multiplexer can support up to 36 interface cards in its chassis. The interface cards support T-1 transmission speeds from 50 bit/sec to 1.5M bit/sec. The product can support up to 32 T-1 links, 864 data channels, 1,584 compressed voice channels or a mixture of such channels.

CN-2 features automatic bandwidth allocation, adaptive route selection, rerouting around trouble spots, adaptive network synchronization, network monitoring and fault isolation. It can be used in conjunction with AT&T's T45 Accunet service.

To configure and manage the multiplexer, a user must purchase Cohesive's Operations Management System, a network management package that runs on NCR Corp.'s Tower series superminicomputers.

Cohesive has been selling products for approximately one year. At last year's ICA show, the company introduced the CN-1 multiplexer, which works with T-1 lines. Shipments began in September and company officials claim some 90 units are running on 12 networks, primarily at large corporations.

GTE Corp.'s Midwestern Telephone Operation company was the first company to place an order for a CN-2 multiplexer. Beta shipments are scheduled for July, and regular shipments should start in September.

The CN-2 components are priced at $70,000 for the basic chassis and $2,500 each for interface cards.

Even the best equipment is worthless if it isn't working right.

When your company's phone system is out of whack, it doesn't really matter how good it is.

What matters is that you've got a group of employees on your hands who are intensely curious about exactly what the problem is. And even more curious about when it will be fixed.

At moments like these, it's heartening to know that you have an ally in US WEST Interline.

Of course, we offer a full range of planning, analysis, installation, training and maintenance services.

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Or you could be forced to make some pretty lame excuses tomorrow.

USWEST® INTERLINE

▶ SWITCH MANAGEMENT

DEC tools debut at ICA

BY JOHN DIX
Senior Editor

ATLANTA — At last week's annual meeting of the International Communications Association, Digital Equipment Corp. unveiled a set of software tools meant to simplify management of switches and inside wiring.

The package, called the All-In-1 System for Telecom Management, is a specially tailored version of the company's popular All-In-1, integrated software that combines commonly used office applications. Other versions of All-In-1 include packages designed for sales, business operations and human resource management.

All-In-1 System for Telecom Management builds on a currently available DEC product called PBX Facilities Management (P/FM). The new integrated version adds two layers to P/FM, Cable Facilities Management (C/FM) and office applications such as word processing.

The new product serves three major functions: tracking and reporting switch usage activity, billing and cable management. Four data base components are used to track customer, site, rate and equipment information. The data bases maintain information on such items as the number of bays, shelves, slots and ports in a private branch exchange. It takes three to six weeks to build the data bases, according to Richard Tritter, marketing manager of office and information systems at DEC.

Once the data bases have been populated, the system can be used for common tasks such as generating and tracking work orders. Typical reports could include traffic management studies, cost allocation and billing.

C/FM tracks circuits from the point at which they enter a building, through wire distribution frames and switches and out to each telephone. Once the C/FM data base has been built, C/FM is automatically updated when work orders are processed, Tritter said.

Although the system was not designed to offer the same features for trunk circuits — the lines connecting a business to its local telephone company — Tom Richardson, manager of office marketing, said the product could be used to build a circuit inventory. The data base would be static, however, and not updated by work order processing.

Integration of word processing and electronic mail makes it possible to create reports on data drawn from the switch and cable management facilities and electronically distribute the reports.

The system is said to work with most PBXs, including AT&T Information Systems, Inc.'s System 85 and Northern Telecom, Inc.'s SL-1. A beta test version for Rolm Corp. switches is nearing completion. The company is also working on a link to AT&T Information Systems' smaller System 75 PBX.

All-In-1 System for Telecom Management ranges in price from $43,860 on a MicroVAX II to $107,960 for a VAX 8600.

Services from **page 6**

crease its meager 4% share of the important business communications market. Business customers traditionally account for the majority of AT&T's service revenues. Bert Roberts Jr., president of MCI, said he expects the company's major growth through 1988 to come from such business services.

Prism III is aimed at companies with monthly bills ranging from $500 to $2,000 and is priced 5% to 15% below AT&T's Wats service. Roberts said Prism III will enable MCI to serve 40% of the Wats market it did not serve before with services such as Prism I and Prism II. Prism II is a Wats-like service intended for users with monthly bills up to $10,000 and Prism I is a high-end service competing with AT&T's Megacom service for customers spending $10,000 and more for monthly service.

Western Union's announcement of compatibility with IBM Professional Office Systems (Profs), while avant-garde, is in keeping with Western Union's messaging service background in telex.

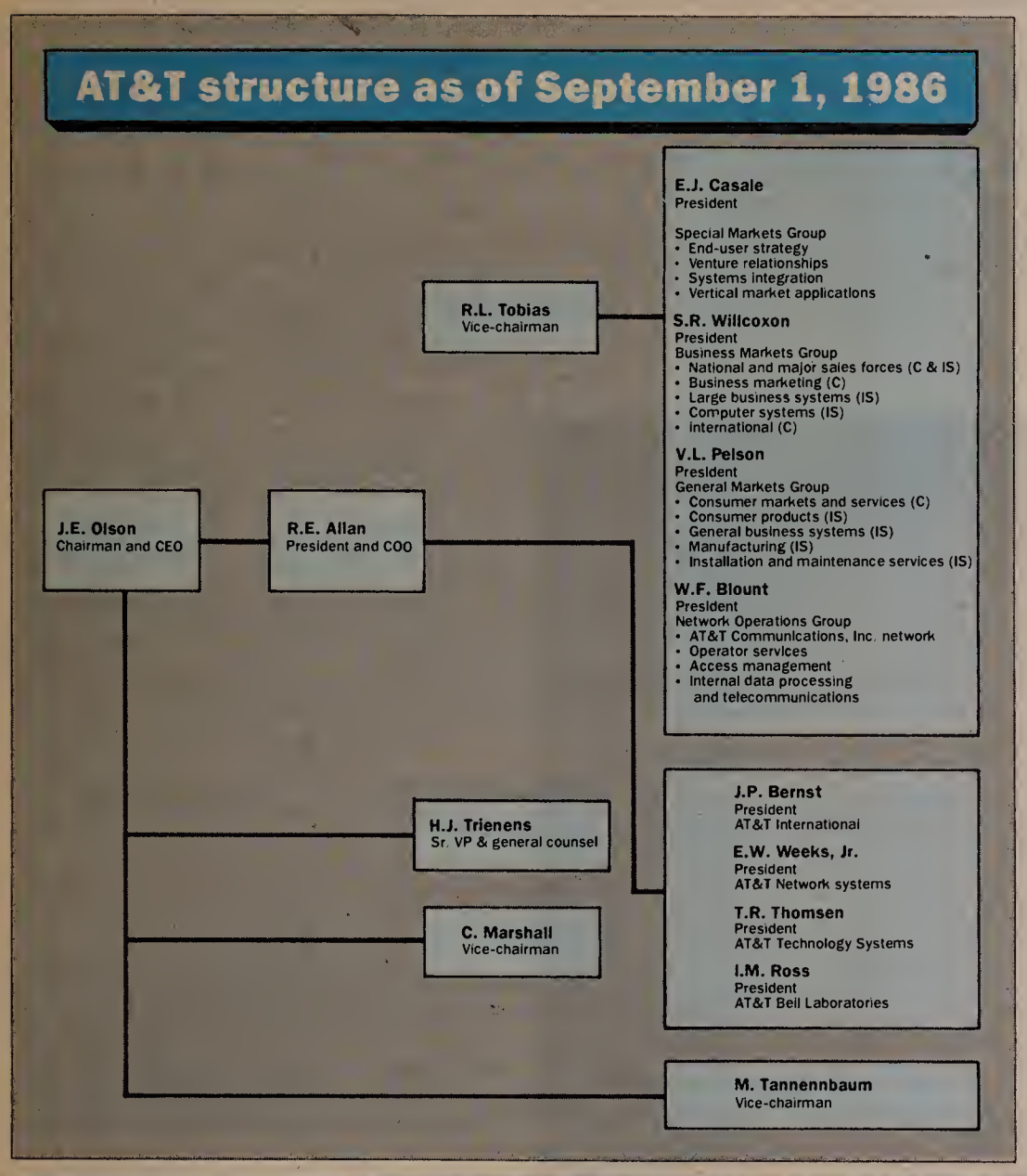
Western Union is supporting Profs through its Easylink electronic mail service by emulating a Profs node. Profs processors think they are talking to another Profs host. Easylink users can send and receive notes and final form documents directly from Profs Mailboxes, or transmit them through Easylink to one of Western Union's paper-based delivery mechanisms: Telegram, Mailgram, Priority Letter or Computer Letter.

Unlike some competing services, Easylink does not require the user to install host software to make the connection between its network and the user's net.

INDUSTRY UPDATE

They said it wasn't so

On inquiry, a spokesman for DSC Communications Corp. of Richardson, Texas, emphatically denied that IBM had shown any interest in purchasing DSC or any of its subsidiaries. "No way," the spokesman said, adding that no other company had approached it looking to buy or merge. Taking no chances, DSC's board of directors last week declared a dividend distribution of one preferred stock purchase right on each outstanding share of its common stock. In a letter to shareholders, the board said the action "effectively represents the interests of stockholders in the event of an unsolicited takeover attempt."



▶ MARKET ANALYSIS

Wall Street watches T-1 networkers

The heat is on big guys, like AT&T Communications.

BY SHARON SCULLY
Senior Editor

BOSTON — If you are a communications manager who is evaluating ways to network data and your company is a big one, you're probably hearing about a lot of ways from a lot of vendors. While these vendors are probably all claiming their solution offers the best price and the most manageability, it may seem to you that they're talking apples and oranges when what you want is a single, solid solution.

It's a fact of life that deregulation is a double-edged sword, wielding, on the one hand, more and better technology, and on the other, what may seem like just more vendors. But according to some Wall Street brokers who make a living evaluating communications industry stocks, the heat these days is on the big guys, such as AT&T Communications, Inc.

Right now, factoring in what they perceive to be your tendency to delay purchasing decisions, Wall Street investors are buying big into a group of vendors whose first shingle in the data networking business read, "T-1 multiplexers."

Today, these vendors include Cohesive Network Corp. of Los Gatos, Calif., Timeplex, Inc. of Woodcliff Lake, N.J., Infotron Systems Corp. of Cherry Hill, N.J., and Network Equipment Technologies Co. of Redwood City, Calif. And they don't call themselves T-1 multiplexer suppliers anymore. Now, they are T-1 private networkers or virtual private networkers.

In spite of the fact that Cohesive and Network Equipment Technologies remain privately held companies, they and all the other cited companies were invited to make presentations to brokers recently assembled here by the investment firm, Alex Brown & Sons, Inc. Significantly, the presentations were attended not only by stockbrokers and portfolio managers, but by mergers and acquisition staff from the likes of AT&T, and Siemens Capital Corp., a subsidiary of Siemens A.G. of West Germany.

Presently, Timeplex is generally acknowledged to dominate the market for high-performance T-1 private network equipment. Earlier this year, Timeplex raised eyebrows on Wall Street by announcing it would accelerate its plans for the development and introduction of a number of new products. In that reversal, the company said it was stepping up these efforts, and simultaneously cutting previously forecast earnings.

Timeplex announced the products to users and potential resellers

See T-1 page 10

VENDOR VIEW

STEPHEN DAY

Video teleconferencing greets new era

Over the last decade, spectacular public failures in two-way teleconferencing seemed to have stymied the potential of video as a mass-market service. Inflexibility, cost and picture quality were cited as the principal factors for companies and organizations choosing to remain in the dark.

Today, the market is finally turning around. Advances in analog transmission and the advent of reliable digital compression technology using coder/decoders are reducing transmission costs as well as providing high-quality, full-motion color pictures.

Competition among carriers with excess capacity is slashing costs. There is a slow and steady growth pattern for video networks, principally point-to-multipoint, as more organizations realize the benefits of using video as part of their overall business planning.

The integration of data and voice with video services is now a reality that is further stimulating market acceptance.

Fortune 100 companies have instituted video networks to hold sales seminars and employee training, for product introductions and purchasing. Brokerage firms are distributing programming to institutional investors. Hotel chains across the country are using private video networks to provide in-room entertainment to travelers, advanced reservations systems and ad-hoc teleconferencing services to local businesses.

Even the military is making an entry, using video networks in the training of army personnel and addresses from the Pentagon.

There are significant cost advantages for organizations that choose satellite-based video networks for distribution of information and entertainment. The advantages of satellites for point-to-multipoint transmission are well known: Geographic separation of receive sites is not a problem, and adding additional sites is achieved at minimal cost. But perhaps the most important cost factor is the long-term lease agreements that video satellite networks offer.

Industry experts are confident that Ku-band transponder costs will be dropping in the next few years. At the same time, the costs for ground segment hardware are declining.

With these factors in mind, video network providers are offering long-term, fixed-cost leases to their customers. Such leases eliminate the guesswork in budget planning and offer an attractive alternative to the escalating costs of terrestrial delivery systems.

Dramatic increases in picture quality and competitive pricing are helping overcome the previous obstacles to widespread acceptance of video networks. The dark days of video teleconferencing are over at last.

Day is vice-president and general manager of sales and marketing for Comsat General Corp., Washington, D.C.

T-1 from **page 9**
at the Interface conference in Atlanta in March. It told Wall Street that it felt the new products were key to maintaining and then capitalizing on its substantial market share in what it called the private integrated services digital network market.

Shortly after the Interface conference, Timeplex announced a joint marketing agreement with US Telecom Data Communications Co. to offer users a single source for both the T-1 hardware and software, and for transmission services ("Timeplex, US Telecom in T-1 team," *Network World*, March 31).

Infotron also announced new products at Interface, and subsequently announced a merger agreement with a local-area networking firm, Applitek Corp., in an $18.5-million deal it said would give it an end-to-end networking product ("Infotron swallows local net firm," *Network World*, May 18).

Following the announcements, E.F. Hutton and Gartner Group issued reports to potential buyers recommending the purchase of Timeplex stock, despite concerns over increased competition in the T-1 markets.

Infotron and Timeplex both announced digital cross-connect systems which they said would be available this fall. Infotron said its Infostream 2500 would support 12 DS-1 interfaces for use with T-1 1.544M bit/sec digital lines and up to three hub configurations. The product is software driven, supports as many as 128 channels of voice and data and can be integrated with Infotron's IS4000 intelligent switching system to provide multiple node networking at T-1 rates.

"Shortly after the Interface conference, Timeplex announced a joint marketing agreement with US Telecom Data Communications Co."

Timeplex announced the Link/2 data/voice network exchange, saying it would give telecommunications managers a direct T-1 interface capability to DS-O/DS-1 channels, digital access and cross-connect systems and private branch exchange T-1 interfaces. Timeplex said it had incorporated an 8-bit byte architecture into the Link/2 product, unlike the 9-bit byte architecture utilized on the company's earlier Link/1 product.

The architecture change will enable Timeplex to interface Link/2 with AT&T Communications' new Accunet T1.5 services, such as customer-controlled reconfiguration M-24 and M-44 multiplexing. Link/1 users would be able to achieve similar compatibility by changing out the Link/1 line card for interfacing with the T-1 line along with a common control or microcomputer card. The AT&T Communications M-24 and M-44 multiplexing services enable users to essentially double the voice/data channel yield of T-1 circuits.

The Timeplex digital cross-connect system (Dacs), a networking system used mostly by telephone companies and large corporations, will enable the company to serve both the private and public network-based sides of the emerging ISDN markets. It allows telephone companies to use their digital T-1 transmission lines more efficiently, switching or flexibly interconnecting T-1 lines with one another when and where capacity is needed. Consequently, telephone companies are able to devise products such as virtual private network services.

"Infotron and Timeplex both announced digital cross-connect systems to be out this fall."

E.F. Hutton noted in its recommendation some risks faced by Timeplex, and consequently, all vendors specialized in the T-1 private network markets. Specifically, Hutton said Timeplex faces increased competition in the T-1 markets, including competition from some of its own customers. The brokerage also noted that users' decision-making processes continue to lengthen due to new product and service evaluations.

TELECOM TRENDS

Equal access: The thrill is gone

Henry Mashke of Hollywood, Calif., recently won $11,111.11 in an MCI Telecommunications Corp. contest in California designed to draw attention to equal access and MCI's "1 Plus" dialing. When told of his good fortune, Henry had no recollection of entering the contest and at first thought it was a prank. That must have taken some of the excitement out of it. So much for equal access.

▶ CABLING SCHEMES

Worry over wire

Installation should leave options open and try to dodge multivendor hookups.

BY JOHN DIX
Senior Editor

Although IBM, AT&T and other vendors have released building wiring plans meant to simplify support of telephones and data devices, user confusion still reigns. Due to differences in topology, methodology and materials, the price to wire a building ranges from $400 to $2,500 per office. The wiring issue began to boil about three years ago when many large organizations realized the growing population of terminals and communicating personal computers was eating up their cable runs. In 1984, John Hancock Mutual Life Insurance Co. in Boston, for example, had to install a multiplexing system in its eight-year-old office tower because the building's vertical wiring shafts, or risers, were filled with coaxial cable.

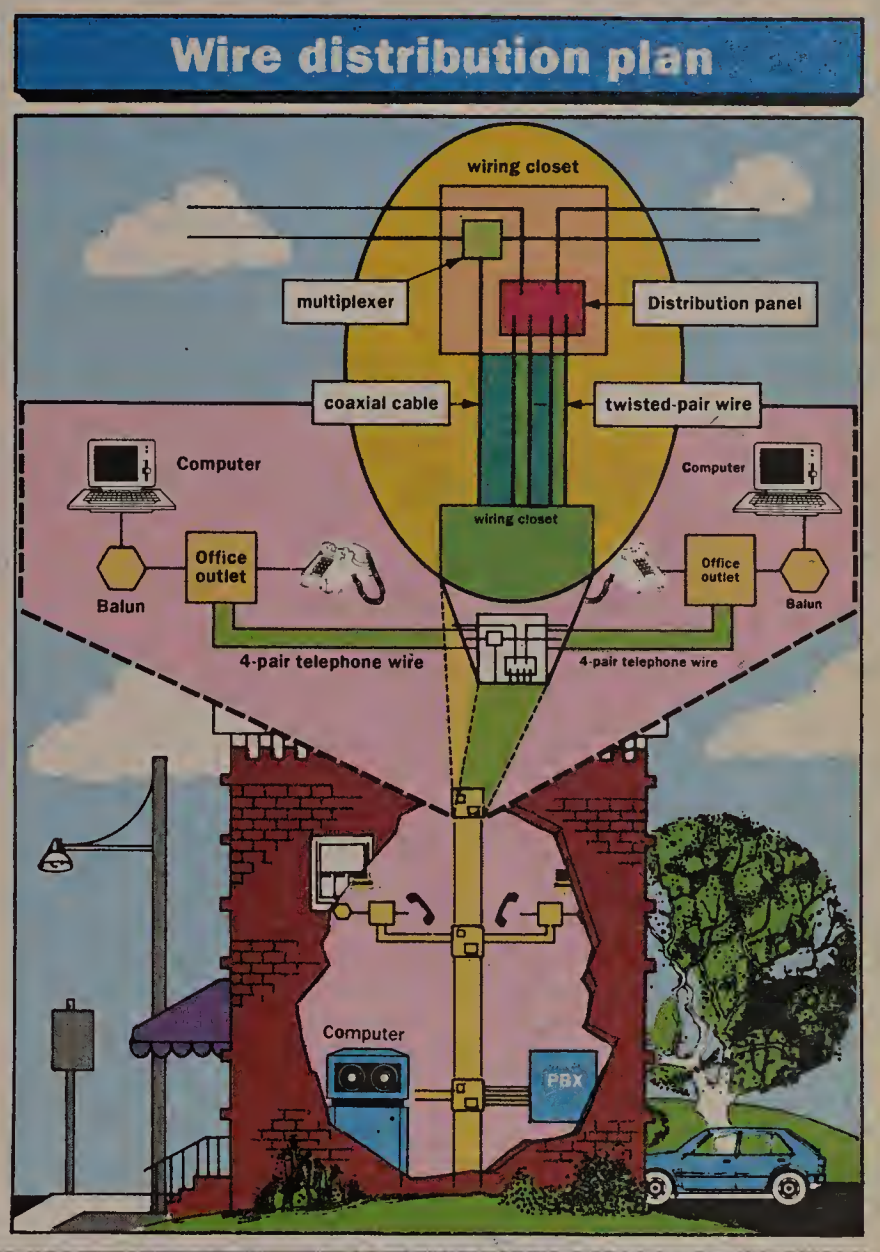
Besides the simple capacity limitations of building risers and horizontal distribution methods — wire trays in the floor or plenum runways in the ceiling — it can cost up to $1,000 to move a terminal from one office to another without a comprehensive wiring system.

While the release two years ago of IBM's Cabling System brought the issue to light and outlined a way to wire a building for data and voice outlets in every office, the system has been accused of being overbuilt and expensive .

Evidence of the first criticism was acknowledged and partially rectified last October when IBM for the first time condoned use of standard twisted-pair telephone wire, including existing wire in some instances, to support data devices. The company had previously required more expensive shielded twisted pair for supporting terminals.

Some users are mimicking the general design of vendor-specific cabling systems and installing wire to support a range of vendor equipment. Jerry Eisen, president

See **Wiring** page 14



CROSS TALK
JOHN DIX

Rejoined AT&T could regain sway

It would be an interesting exercise to calculate how much it cost AT&T, its stockholders and its customers to split the company into separate organizations to provide long-distance service and customer equipment and then remerge those units. The figure would have to approach a billion dollars.

The absurdity of the two-and-a-half-year exercise — which ended with the Federal Communications Commission's recent Third Computer Inquiry — must bring a grin to the face of proponents of a unified AT&T and a smirk of disbelief to competitors.

What has changed since divestiture to convince regulators that AT&T will no longer hamper industry competition by drawing revenue from its profitable, regulated services business to fortify its unregulated ventures, such as its struggling computer division?

The FCC assures the industry that new accounting requirements will prevent AT&T from cross-subsidizing. Besides the difficulty in finding and proving any kind of accounting wrongdoing, subsidization also comes in the form of account leads and access to customer histories. Information about AT&T long-distance service customers would be a rich and valuable asset to sales representatives peddling AT&T equipment.

The billion dollar experiment — segmenting AT&T and then cementing parts of it back together again — can be blamed on the fact that there were too many chefs diddling with the recipe. A federal district court judge modified the Department of Justice's proposal to break up AT&T, and the FCC was left to regulate the mess.

Jurisdictional questions still remain. The need for separate subsidiaries was a key element of the Modified Final Judgment, the document that ended the age-old antitrust litigation that resulted in the divestiture of AT&T. What do U.S. District Court Judge Harold Greene and the Justice Department think about the removal of that stricture?

To be fair, the market has changed since AT&T was dissected. The single most significant development was IBM's acquisition of Rolm Corp. and its investment in MCI Communications Corp. That troika, which is just now beginning to flex its muscles through joint sales efforts, could become a powerful contender to AT&T.

While competition between AT&T and the combination of IBM, Rolm and MCI will create something interesting to watch, the vendors that will suffer the most from the reassemblage of AT&T will be the small communications equipment manufacturers.

Since divestiture, the market for small to mid-size switching gear has exploded. Equipped with data on user habits and needs gleaned from long-distance service records, the new AT&T sales force will become a formidable competitor for the new low-end switch brood.

▶ BELLCORE

Thumbs up for ISDN

BY JOHN DIX
Senior Editor

LIVINGSTON, N.J. — A field trial coordinated by Bell Communications Research, Inc. on behalf of the divested Bell operating companies has proven the feasibility of providing voice/data integrated services digital network services over existing copper subscriber lines.

The experiment, conducted by New York Telephone Co. on Long Island, N.Y., is the first in a planned series of Bellcore-sponsored tests to study the feasibility of implementing ISDNs.

The trial tested a line code capable of sustaining a 160K bit/sec digital signal at distances up to 18,000 feet, the maximum distance of most metropolitan local loops.

The capacity of the 160K bit/sec line, called 4B3T, would be divided into three channels under the basic rate ISDN signaling specifications: a 64K bit/sec channel for digitized voice, a 64K bit/sec channel for data and a 16K bit/sec channel for signaling and possible packet data

See **Trial** page 14

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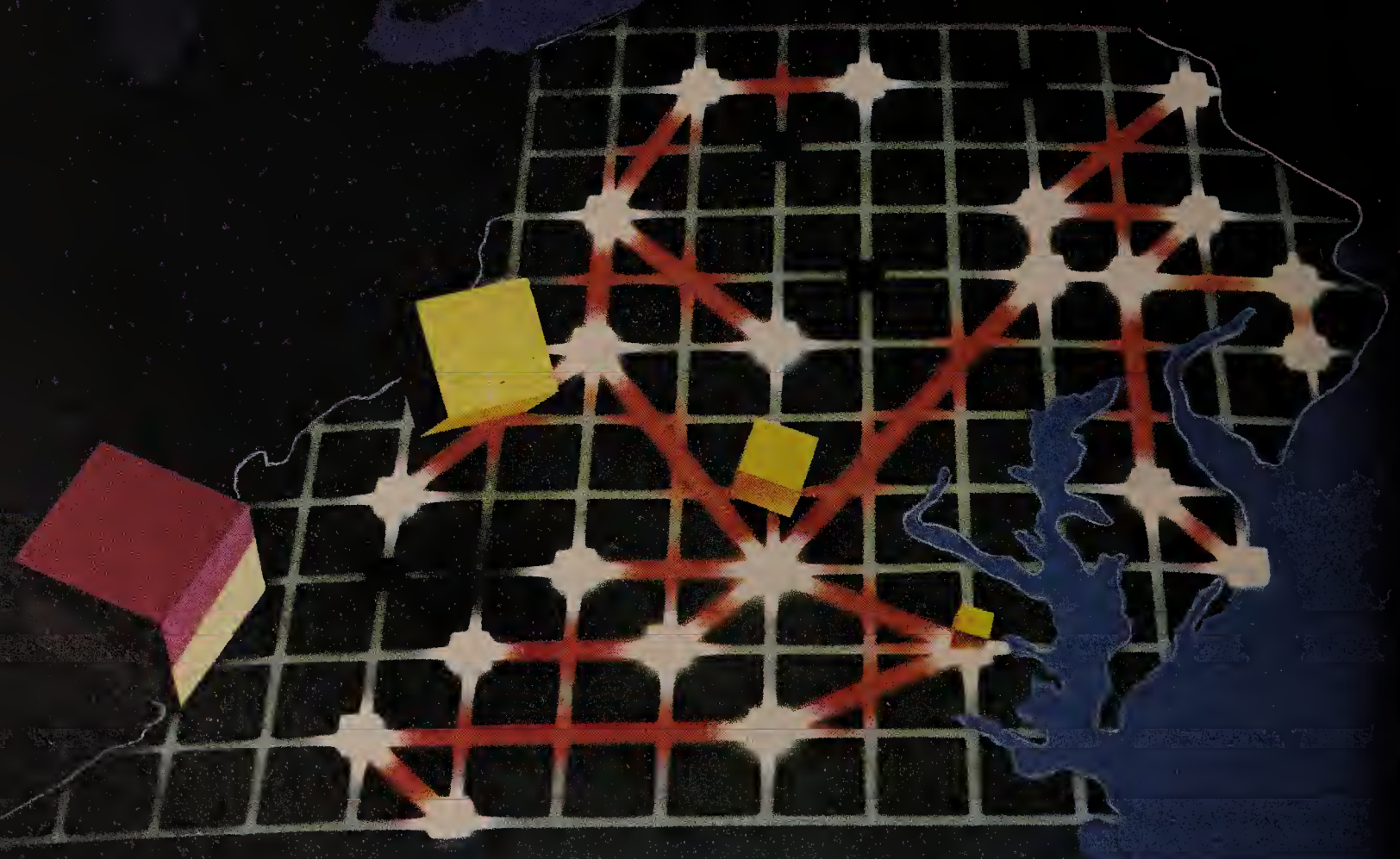
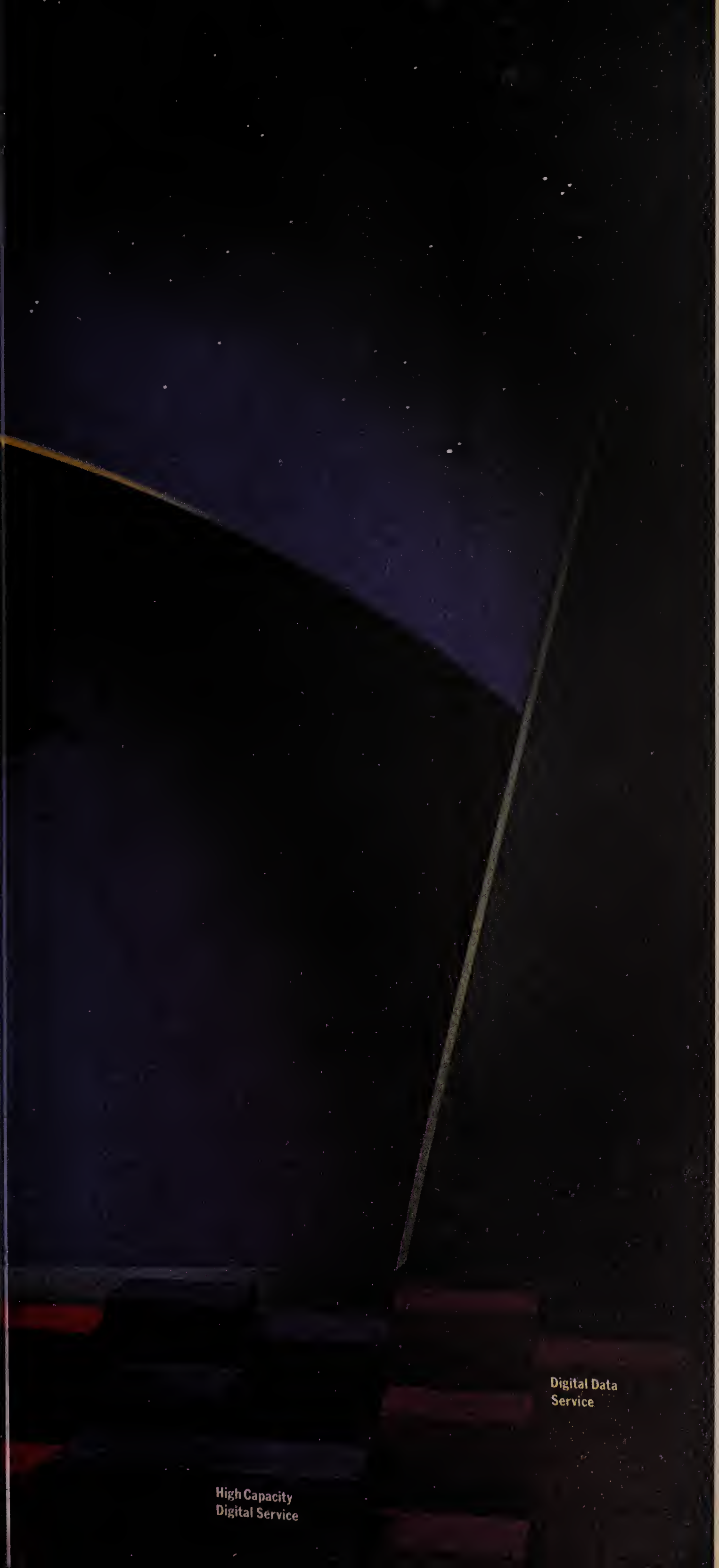


Public Data Network

Digital Connect Service

High Capacity Lightwave Service

Central Office LANs



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Wiring from **page 11**
of Office Sciences International, Inc., a consultancy in Iselin, N.J., involved in intrabuilding and multivendor networking, is doing just that for a large client.

The customer wanted to wire its 350-office building, which dates back to the late 1800s and was put up in three stages, to support computer equipment from Wang Laboratories, Inc., Digital Equipment Corp. and IBM, and a private branch exchange from Northern Telecom, Inc.

Eisen recommended the customer install a cabling system based on a wiring closet concept. In this scheme, wiring closets on each floor are used to house a series of inexpensive multiplexers, one each for IBM, Wang and DEC equipment. These multiplexers will run over a single coaxial cable or fiber-optic connection down through the building's vertical risers to the processing equipment. The price for each multiplexer port will range from $200 to $500, depending on how heavily loaded the device is. The vertical riser cable, which is shared by many users, adds a slight extra per office charge.

The wiring closets also serve as collection and distribution points for standard telephone wire not requiring multiplexers.

For the horizontal run out to each office, Eisen recommended the installation of two four-pair standard telephone wires at an estimated cost of $150 per office. The total cost per office would thus range from $350 to $650.

"The horizontal wire would be standard and independent of what goes into the offices in the future," Eisen said. "Where we differentiate the system is in the closet, whether we hop onto the DEC, IBM or Wang multiplexer." The synchronous IBM and Wang equipment would be supported with baluns, small devices that convert the coaxial cable attachment typical of this equipment into a twisted-pair wire connection.

Eisen estimates this client will save $250,000 over traditional wiring methods. Those savings will grow with time because the wiring plan allows devices to be moved at a fraction of what it would cost to recable with each move.

Although excessive today, the 16-wire horizontal runs leave future options open. Besides the wire pairs dedicated to PBX use, the system will have enough wire to support multiple data connections. "If we put personal computers in those offices and wanted to have a work group local network within a department, we would be able to wire up the net and, if desired, provide an additional direct host attachment over the same wire set," Eisen said.

Because the cost of wire is typically less than one-third the cost of cable installation, it is important to provide insurance options by installing more cable than you may need now.

The cost of labor, which is sensitive to the size of the job, is the largest cost component of installing a wiring system. One large installation job will result in a lower cost per office connection than a piecemeal installation process.

Regardless of potential savings, few wiring systems are worthwhile if the vendor whose equipment will be supported does not recognize the wire type within its maintenance contract, Eisen warned.

"If the vendor hasn't said it's okay, you are asking for more grief than you will realize with any savings on materials," Eisen said.

Trial from **page 11**
communications. Remaining capacity would be reserved, possibly for meter reading or other services.

The 4B3T line code did not interfere with other voice/data multiplexers and 56K bit/sec digital services operating on the same local network. Bellcore intends to test other line codes this summer.

DATA DELIVERY

"A number of communications markets are so small that IBM cannot justify building its own products. When any market's revenues are less than $200 million, IBM is more likely to enter an original equipment manufacturer agreement than build the equipment itself.

Frank Dzubeck
president
Communications Network Architects, Inc.
Washington, D.C.

Selected high-speed modem characteristics

	Model	Data rate	Average throughput	DTE interface	Autodial/ autoanswer	Error protection	Data compression	Adaptive rates	Line interface	Half/full duplex	Hayes-compatible	Cost
Carterfone	Adcomm 96/48	Up to 19.2K bit/sec	9.6K to 12K bit/sec	Asynchronous	Yes	CRC & retrans-mission	Yes	Yes	2 wire 4 wire	FDX	Yes	$1,695
Paradyne	HDX 12000	12K bit/sec	12K bit/sec	Synchronous	Yes	TCM	No	Yes	2 wire	HDX	No	$2,900
DCA	Fastlink	Up to 18K bit/sec	14.4K bit/sec	Asynchronous	Yes	CRC & retrans-mission	No	Yes	2 wire	Slow speeds: full duplex Fast speeds: adaptive duplex	Yes	PC Modem: $1,995 Stand-alone: $2,395
Microcom	AX/9612C AX/9624C	Up to 19.2K bit/sec	12-16K bit/sec	Asynchronous/ synchronous	Yes	MNP	Yes	Yes	2 wire	FDX	Yes	$1,799
Codex	2680	19.2K bit/sec	19.2K bit/sec	Synchronous	N/A	TCM	No	Yes	4 wire	FDX	N/A	$15,000

CRC = Cyclic redundancy checking TCM = Trellis-coded modulation MNP = Micro networking protocol

SOURCE: NETWORK STRATEGIES, INC., FAIRFAX, VA.

DATA DIALOGUE

MARY ST. CIN

Throughput vs. hype

Data communications users have the opportunity to significantly reduce line costs, improve response time and add capacity to existing networks by using high-speed dial-up and leased-line modems. Some vendors claim that their products transmit data at speeds up to 19.2K bit/sec. However it is important for consumers to read the fine print in glossy magazine advertisements so they will fully understand the products offered.

Two years ago, 9.6K bit/sec was considered the maximum transmission speed achievable on analog lines. Currently, high-speed modems make up the fastest growing segment of the modem market.

Some of the features of the products of five major modem manufacturers are listed in the above chart.

When choosing a modem, a user should make a distinction between the data rate claimed by the vendor and the effective data rate or throughput. Many modem advertisements tout speeds of 19.2K bit/sec. These speeds are dependent on certain ideal line conditions, for example, errorless transmission and transmission of data with certain redundancies, which enable data to be compressed and increase throughput. If errors that require a number of retransmissions occur or if the data cannot be compressed, then the data throughput will be lower.

The importance of this distinction can be seen if one compares the various vendors' claimed modem speeds. For example, the Carterfone Communications Corp. Adcomm 96/48 modem can transmit data at speeds up to 19.2K bit/sec. However, this speed can only be achieved under conditions where there are no errors requiring retransmission and the data can be compressed. The average throughput of the Carterfone modem is 9.6K to 12K bit/sec.

In comparison, Paradyne Corp.'s HDX 12000 modem has a claimed data rate of 12K bit/sec. In looking at only the data rates, the HDX 12000 may appear to be a less sophisticated modem. However, 12K bit/sec throughput is a realistic figure since Paradyne does not use data compression and error protection is provided by trellis coding. A user may achieve a significantly higher throughput with the Paradyne modem than with another modem that claims to support higher transmission speeds.

Emerging error protection

See **Modems** page 16

St. Cin is a staff consultant for Network Strategies, Inc., a consulting firm in Fairfax, Va.

▶ MULTIVENDOR NETS

Stratus gets behind SNA

BY NADINE WANDZILAK
Staff Writer

MARLBORO, Mass. — Stratus Computer, Inc. recently announced two software products that enable its fault-tolerant minicomputers to support peripherals compatible with IBM's Systems Network Architecture. Stratus also committed to future support of IBM's LU 6.2 interface.

Stratus SNA Device Support is software intended for use by Stratus programmers. When implemented, the communications facility provides the translation needed between the synchronous protocols and Ebcdic code typical of SNA devices and the asynchronous Ascii Stratus environment.

The product's use requires programming skills and knowledge of SNA, according to Larry Sherman, manager of product support programs at Stratus. It provides compatibility with the five lower levels of SNA. Programmers can build applications to support remote banking terminals, for example, by writing high-level code defining the particulars of the remote devices supported and the type of application.

Because its systems are fault-tolerant, Stratus anticipates the software will be used by companies building transaction-processing networks to support automated teller machines and devices such as IBM's 3650 retail and 4600 financial terminals.

By adding emulation software to SNA Device Support, it is possible to achieve pass-through capabilities, where traffic from attached terminals is routed through the Stratus processor to an IBM host located upstream. This makes the Stratus processor appear to the host as an IBM 3274 display controller.

Stratus SNA Device Support is available immediately at a one-time charge of $4,000 per system. The pass-through capability supporting the mainframe connection will be available in the fall of 1986.

In addition to providing the necessary protocol and code translations, the second product announced, Stratus SNA 3270 Device Support, provides higher level code specifically tailored to support IBM 3270-type terminals, controllers and printers. It builds on the lower level software of Stratus SNA Device Support.

Sherman said the company has not yet tested 3270 terminal response time when used with a Stratus processor. The company also has not yet calculated a realistic maximum number of terminals a Stratus system could support.

See **Stratus** page 16

Stratus from **page 15**

SNA 3270 Device Support, which includes Stratus SNA Device Support, will be available in the fall of 1986 at a charge of $5,000 per system.

Stratus lags behind

Analysts welcomed the new capabilities, but pointed out that the company has lagged behind its competitors.

According to Craig Symons, vice-president of the Gartner Group, a Stamford, Conn.-based research house, other minicomputer manufacturers, such as Digital Equipment Corp. and Data General Corp., have been offering SNA products for a long time. He added, however, that Stratus has been in existence for only three years.

Looking to the future, Stratus said it intends to support SNA LU 0 and LU 6.2 interfaces by the middle of next year. According to Sherman, LU 0 will provide a protocol for application-to-application communications between different systems.

LU 6.2 will enable the company to support peer-to-peer communications between devices such as workstations, personal computers, mid-range and large systems.

The mid-1987 availability date for LU 0 and LU 6.2 is late, according to Dave Terrie, editor of Patricia Seybold's *Network Monitor*, an industry newsletter. "LU support products will be available from third-party software people or most major vendors certainly before the end of this year," he said.

Modems from **page 15**

techniques compensate for the high degree of line disturbances that previously made high-speed transmission unreliable over both leased and dial-up lines. Trellis-coded modulation (TCM) is the newest, most sophisticated method of error protection.

TCM is an extension of Quadrature Amplitude Modulation, in which redundant code bits are added to the data for the purpose of error checking. Modems equipped with this type of error protection, such as Codex Corp.'s 2680 and the HDX 12000, are usually more sophisticated and more expensive.

Retransmission is another error protection scheme used by modem manufacturers. The modem will check blocks where errors are detected. Microcom has developed the Microcom Networking Protocol (MNP Class 6) for its dial-up modem, which provides retransmission and adjusts packet size based on the error conditions of the line. The Digital Communications Associates, Inc. (DCA) Fastlink and Carterfone modems provide cyclical redundancy checking and request retransmission when errors are detected.

Most manufacturers also provide the capability to adapt the speed of the transmissions to the conditions of the line. When a high number of errors are detected and throughput decreases to a certain level, the modems lower the transmission rate to reduce errors.

According to Frank Gonzales, Paradyne product manager, the HDX 12000 lowers the transmission speed when throughput falls below 80%. Microcom and DCA provide another type of adaptive rate capability that allows the modems to allocate line bandwidth and data traffic, depending on the type of traffic.

File transfers, for example, will require much higher bandwidth on the host end than on the terminal end. The Microcom and the DCA Adaptive Duplex capability allows the modem to allocate the bandwidth based on the application.

Some modems may adjust the transmission speed based on the receiving modem's capability. For example, the DCA Fastlink modem automatically determines if the remote device is another Fastlink, a 212 equivalent or a 103 or 212A signaling convention and will adjust the speed accordingly.

FACTORY COMMUNICATIONS

"Some of our industries will fail. Some of them will actually collapse. But it's not because they have to; it's because they are unwilling or unable to invest the capital in the technology required to become a world-class competitor.

J. Tracy O'Rourke
president and chief executive officer
Allen-Bradley Co.
from a speech entitled, "Keys to automating information"

▶ INDUSTRY MOVES

Tandem, Arthur Young team up

Duo to focus on factory solutions.

BY BOB WALLACE
Senior Writer

Tandem Computers, Inc. and Arthur Young signed an agreement designed in part to increase the use of Tandem computer systems in manufacturing applications — an area currently dominated by Digital Equipment Corp. and IBM.

The first of its kind, the alliance bodes well for Tandem systems users and Arthur Young's clients. The alliance, however, raises questions as to the objectivity of consultants whose parent company has entered into an agreement with an equipment vendor.

The announcement should come as no surprise because several large management consulting firms have beefed up their manufacturing consulting groups. These firms have targeted the manufacturing industry as a strong market in which they could sell their specialized consulting services.

Under the agreement, Arthur Young consultants will assist Tandem's manufacturing customers with the planning and implementation of computer-integrated manufacturing (CIM) systems in their production facilities. CIM is a popular strategy that calls for the integration of all systems within a specific manufacturing facility or across multiple locations.

Arthur Young consultants will also recommend Tandem networks to their manufacturing clients. The agreement, however, is not exclusive. Tandem and Arthur Young will offer a CIM package to manufacturers consisting of Tandem network hardware and software as well as network planning, strategic planning and implementation services. Each company's resources will still be available separately.

Arthur Young is one of the Big Eight international accounting and management consulting firms. Arthur Young boasts a 600-man strong Manufacturing Consulting Group, more than 525 members of which are located in the U.S.

David Frost, manufacturing industry marketing manager for Tandem, said 20% of the company's $700 million in revenues came from computer systems sold to manufacturers. He said half the Tandem systems sold to manufacturers are used in Production Control and Manufacturing Resource Planning (MRP) applications.

Frost said Tandem will more aggressively promote its position in the manufacturing industry. "Our Number 1 goal is to make [the Tandem computer] the plant host," he asserted. "We want to go after DEC and IBM, whom we feel are our prime competitors in this market."

Frost said the company's Non-Stop line of fault-tolerant computers can serve as the computer system that controls operations on the

See **Tandem** page 18

INCIDENTALS

Factory networkers interested in the field of robotics might want to check out *Robotics and Computer-Integrated Manufacturing*, a journal published by Pergamon Press in New York.

The publisher claims the book features the latest research on robotics as it relates to flexible manufacturing systems.

Pergamon Press also offers a variety of publications focusing on specific aspects of manufacturing. For additional information on any of Pergamon Press' publications, call (914) 592-7700.

U.S. Data Corp. of Richardson, Texas, has signed a one-year renewable agreement with Eagle Signal Industry Controls that will allow the latter to market U.S. Data's industrial products along with Eagle's line of programmable controllers.

It is estimated that the agreement will result in additional sales of U.S. Data's products in excess of $5 million.

Eagle Signal will market U.S. Data's Factory Link industrial automation software, React Intelligent Color Graphics Consoles, PEX-1 Industrial Interconnect Switches and its Flexus Intelligent Pushbutton Operator Console Panels.

FACTORY FACTS
BOB WALLACE

Ask before you consult

The recent agreement between Tandem Computers, Inc. and Arthur Young, an international management consulting firm, will have several ramifications for factory networkers (see related story above).

The alliance between a major computer systems supplier and a consulting group of equal stature sets a precedent for similar agreements. It is no secret that a number of major consulting firms have established sizable manufacturing consulting groups.

These firms have targeted the computer-integrated manufacturing (CIM) industry as a market in which they can peddle various consulting services. Price Waterhouse & Company, Booz, Allen and Hamilton, Inc. and Peat Marwick, Mitchell and Co. all offer specialized manufacturing consulting services. The list will grow rapidly in the coming months.

Consultants like those employed by Arthur Young's Manufacturing Consulting Group have long been hired to provide important guidance to confused communications equipment and services users.

Problem-solvers

Consultants are usually asked to recommend products and services that will help users solve their networking problems. Their objective views are welcomed by users who are often either confused or unaware of the capabilities of certain products and services.

Although details of the Tandem-Arthur Young agreement are sketchy, the fact that the two groups have joined forces to offer CIM solutions raises a conflict-of-interest question. Can a consultant whose parent company has signed an agreement with an equipment vendor objectively recommend products and services? Or do these consultants become merely value-added resellers of the vendors' equipment?

See **Consultants** page 18

▶ HEWLETT-PACKARD

Model 840 joins 9000 Series line

Supermini targets engineering, design applications.

BY JIM BROWN
New Products Editor

Hewlett-Packard Co. added a superminicomputer to its HP 9000 Series 800 line. The new product is the latest to come out of the firm's Spectrum program designed for computer-aided design and computer-aided engineering applications.

The Model 840 runs under the HP-UX operating system, Hewlett-Packard's AT&T Unix System V-compatible software, and implements HP Precision Architecture, which is based on a reduced-instruction-set computer design. A 4.5 million instruction per second processor will support up to 24M bytes of main memory.

The system supports file transfer to other Hewlett-Packard Series 800 computers and Hewlett-Packard Series 300 workstations in a local-area network by using Advanced Research Projects Agency (Arpa) and Berkeley Unix 4.2 networking protocols on an Ethernet or IEEE 802.3 local-area network. Hewlett-Packard recently announced its HP Advancenet will now support Arpa/Berkeley networking protocols to allow its Model 840 to talk to Digital Equipment Corp., Sun Microsystems, Inc. and other non-HP computers used in the engineering, scientific and government, and corporate and university research department environments.

The Model 840 also contains relational data base management system software and a software tool for sharing data base information between applications, which include engineering functions such as circuit simulation, finite-element analysis, personal computer board routing, image analysis, detailed statistical studies and software development.

A Model 840 system with 8M bytes of main memory, an access port card set with six-channel multiplexer, a system processor and floating-point co-processor costs $113,500. Add-ons such as a console terminal, system disk drive and a cartidge or 1/2-inch tape drive are extra.

Tandem from **page 17**
plant floor. He added that Tandem systems are capable of communications with such factory floor equipment as robots, numerical controller devices, ruggedized terminals and other plant automation devices.

Although Tandem has fared well in the banking and financial industries, its success in the manufacturing industry has been somewhat restricted to aerospace-type manufacturers.

The agreement raises the question of whether or not a consultant can objectively recommend products and services if his or her employer has entered into an agreement with an equipment vendor.

> *"Tandem's not the only answer to CIM problems, but it's a good one."*

Woodrow Chamberlain, a partner in Arthur Young's Manufacturing Consulting Group, claimed the firm's consultants will not be delivering Tandem sales pitches to Arthur Young's clients.

"We would not only recommend [Tandem equipment] to a client. It's not the only answer to CIM problems, but it's a good one," Chamberlain claimed.

He added, however, that Tandem systems stand out among systems offered as CIM solutions.

"When we talk to clients about what alternatives they have, we will obviously be inclined to mention Tandem as having one of the superior solutions. That is different from saying Tandem has the only solution in the world — but we do say the Tandem solution is a superior one."

Chamberlain said Arthur Young is not actively pursuing similar agreements with other hardware vendors but did not address the possibility of the consulting firm joining forces with a network software vendor.

The agreement should have several positive effects for Tandem customers seeking guidance with the implementation of networks and computer systems in their production facilities.

Tandem's Frost explained that manufacturers require more than network hardware and software for their factory floors.

"You can't just dump hardware and software on manufacturers without providing them with an implementation plan," he claimed. "

Consultants from **page 17**
Factory networkers are now saddled with the chore of having to check a consultant's parent company's vendor affiliations. Users should not underestimate the need to perform this background check.

Only after the consultant has fully answered the user's questions should the user decide whether or not to hire the consultant. Blind faith in a consultant could cause problems.

Users will undoubtedly ask, "Why should we care if a consulting group is aligned with a vendor?" If you wanted an objective opinion as to the best make of station wagon, would you walk onto a dealership's lot and ask the first salesman who greeted you?

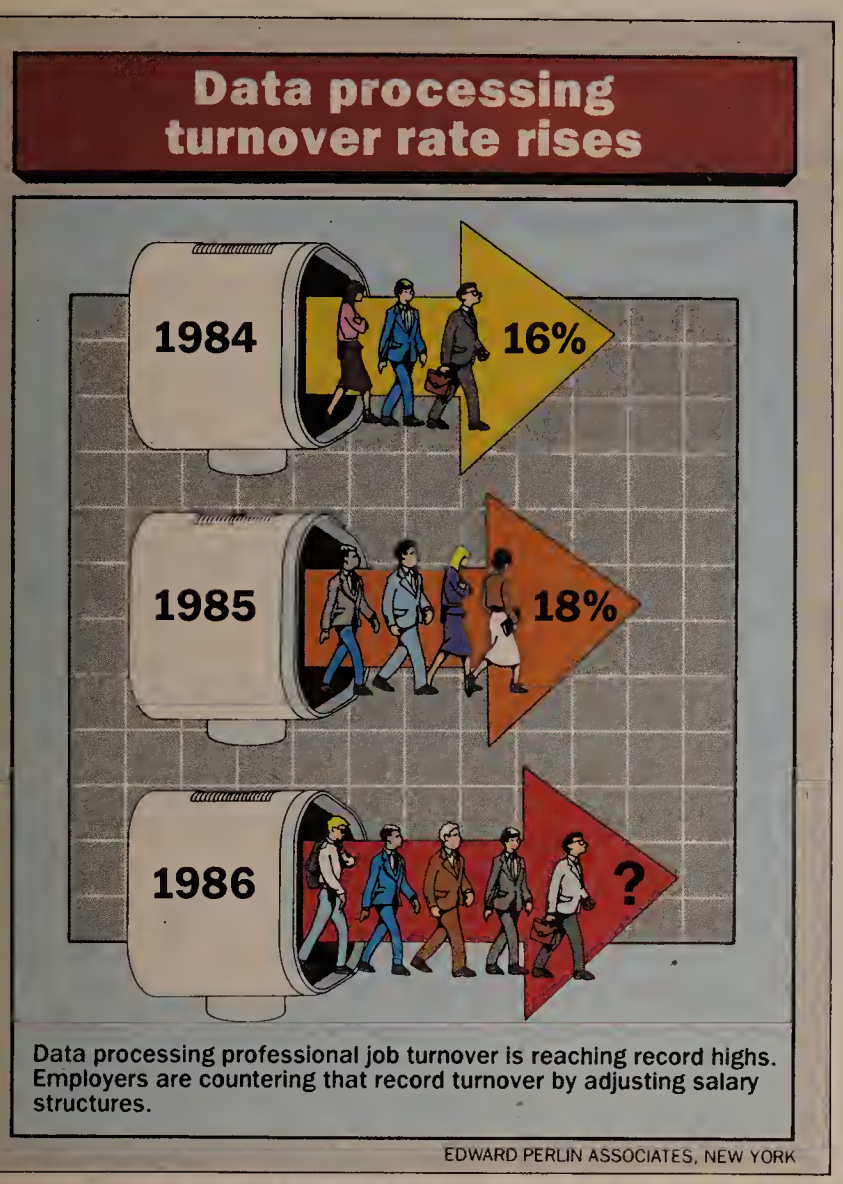
If you wanted an objective opinion on which city in the nation is the best to live in, would you contact a real estate agent who sells houses in New York City? If you wanted to send your son to college and you were looking for an objective opinion on which university offered the best education, would you ask an admissions director from Notre Dame?

Ask questions first, buy equipment after.

COMMUNICATIONS MANAGER

"Billing errors are rampant. One of my clients received a $450,000 refund due to a recurring mistake that lasted several years. The average refund for billing errors is about $15,000. If a user is not frustrated by billing problems, it is probably because he is simply not aware of them or does not know where to look.

Doug Arnold
president
Doug Arnold & Associates, Inc.
communications consulting firm
Garland, Texas



Data processing professional job turnover is reaching record highs. Employers are countering that record turnover by adjusting salary structures.

EDWARD PERLIN ASSOCIATES, NEW YORK

▶ COMMUNICATIONS MANAGER

User frustrations surface in survey

BY MARGIE SEMILOF
Senior Writer

Pinpointing the cause of network failure is an irritating job. But some users claim that once a problem has been isolated, difficulty in getting properly trained personnel with the right equipment to fix the problem may be a larger headache.

These claims were stated by users when asked to comment on the results of a recent survey conducted by Barto and Associates, a Louisville, Colo.-based market research firm. The survey reported that the two biggest sources of frustration for communications managers were vendor finger-pointing and billing inaccuracies.

Maria DiLeo, supervisor of terminal communications at the Garden City, N.Y.-based Avis Rent-a-Car System, Inc., said network management and control products have helped.

But even with the help of those management tools running at Avis' control center, problems can be difficult to track. Avis has minimized potential problems by having at least five vendor technicians from different companies visit when a breakdown occurs.

"We work with these technicians at our control center," DiLeo said. "They are less likely to blame each other when they are all working at the problem site," she continued.

"Sometimes the technician cannot find the trouble within a specific piece of equipment," she said.

"We may be 3,000 miles away from him, and we have to take his word that he has done all he can to repair the equipment or even that he has the necessary knowledge to fix the problem on the first try," she added.

See **Survey** page 20

GUIDELINES

ERIC SCHMALL

How to battle forces of network failure

Problem determination and resolution (PDR) has proven to be the bane of many a communications manager's existence. Perhaps it's because people don't like to think about long or frequent network outages that cut into vital line availability statistics.

More likely it is that the communications system has not been properly organized to isolate problems and pursue corrective action.

To fight network disruption, the user needs at least three tools: technical diagnostic aids, an educated technical staff and rational direction.

But the presence of these three elements is not enough. They must also be well-balanced so the PDR function produces a whole process that is greater than the sum of its parts.

Hardware and software diagnostic aids are the first items that come to mind when the subject of PDR comes up. There is no paucity of equipment with the sole function of acting as a sentinel watching lines, trunks and response times and setting off alarms when thresholds are crossed or critical components begin to weaken. It is easy for a manager to overbuy these products.

A sage once said that a man with one watch always knows what time it is; the one with two is never quite sure. A network with too many overlapping diagnostic aids is vulnerable to conflicting reports. PDR becomes more complex when the network operator does not know which tool to believe. Proper hardware and software diagnostic aids should be complementary, not redundant.

None of this expensive equipment is useful to a network management center if the technicians are not given training in communications system interrelationships. The network manager must provide a continuing education program in PDR for communications technicians at each level.

A minimum of one course in PDR should be given to each technical staff member each year. That policy, combined with the seasoning of everyday experience, is the surest way to a mature and capable staff.

The best tool in the hand of a competent technician is a comforting thought. But PDR also requires rational direction. In the heat of a critical outage, it is surprising how quickly common logic wilts.

When the most likely causes of a specific problem have been discounted, discouragement often begins to settle in. Strange hypotheses begin to be suggested and tested, leading to more frustrating dead-ends.

The only way to keep this syndrome from developing is for the manager to keep the staff firmly grounded in tests and activities that are based on sound logic.

Unfortunately, sweet reason cannot stand alone in the PDR process. The validity of the hypotheses that are products of the logical approach need to be tested. If the network center

See Network **page 20**

Schmall is network systems manager for an insurance holding company.

PEOPLE

The Institute of Electrical and Electronics Engineers Computer Society presented the 1986 Computer Entrepreneur Award to **Kenneth H. Olsen,** president of Digital Equipment Corp.

Alex Jacobson, co-founder of Inference Corp., **Jan Grinberg** and **William Blehe,** of Hughes Corp., and **Terry Beard,** formerly of Hughes, were awarded the Rank Prize from the Royal Institution of London.

The prize is awarded to those persons making significant contributions in the science of opto-electronics.

George Harvey was appointed vice-president of Rolm Corp.'s Business Development Group.

J.S. Habblet was appointed general manager of the Government Systems Group at Softech, Inc.

James Whalen has been elected to the position of corporate controller at Cincinnati Microwave, Inc.

John Ralston was appointed as president of SL Waber, Inc.

Maurice Ridgrigue was appointed president of the telephone systems division at Walker Telecommunications Corp.

Survey from **page 19**

Doug Arnold, president of Doug Arnold & Associates, Inc., a Garland, Texas-based consulting firm, said complaints like DiLeo's are common. He estimated that less than 1% of vendors have access to a trained network engineer.

"When a technician comes in to work on a user's network, I can make three guesses," Arnold said. "He is also maintaining at least three other networks in other locations. His average length of employment with the company he represents is less than two years. He probably has not had extensive training. In fact, he probably has had no transmission training at all.

"The technician often knows less about the overall network than many communications managers," he added.

Billing errors ranked as the second largest source of frustration among users. Many users concede that as long as they receive voluminous invoices covering hundreds of pieces of equipment, billing mistakes will exist. But Arnold said users should make the effort to double-check each item on their bills regardless of the bill's complexity. Many users have discovered that they qualify for large refunds stemming from past billing errors.

"One of my clients received a $450,000 refund when we found a recurring mistake that lasted several years," he said. "The average refund for billing errors is about $15,000," Arnold said.

"If a user is not frustrated by billing problems," Arnold added, "it is probably because he is simply not aware of them or does not know where to look for them. Telecommunications managers are sent a budget. As long as that budget is not exceeded, no one cares."

Arnold said most communications managers spent years paying the same bill from the Bell system and now have neither the time nor training to understand and check each line item.

"The user should make the vendor come in and explain all parts of the invoice," he said. If the vendor refuses, get another vendor."

Ron Martin, data communications manager at American General Life & Accident Insurance Co., thoroughly examines monthly bills from several vendors and steadfastly refuses to pay any amount he considers suspect.

"My AT&T bill is six inches deep," he said. "I have at least three other bills that are at least one inch thick. If I find a billing error, I either pay a portion of that bill or don't pay it at all until it's corrected. That usually resolves the problem."

▶ ASSOCIATIONS

AT&T VP to speak

The Association of College and University Technical Administrators will hold its 15th annual conference from June 29 to July 3 in Norfolk, Va. Arno A. Penzias, vice-president of research at AT&T Bell Laboratories, will speak on education in a networking environment. For more information, call (216) 368-4396.

Empire Wo/Men in Telecommunications (WIT) will hold its monthly business meeting at 5:30 p.m. on June 12 at 2 World Trade Center in New York. The cost is $10 for WIT members and $20 for nonmembers.

The group will also sponsor a management skills workshop from 8:30 a.m. to 3:30 p.m. on June 21 at the Fashion Institute of Technology, 227 W. 27 St., New York. Courses offered will include time management, computerizing telemanagement functions, management techniques and negotiating successful vendor and user contracts.

The seminar costs $50 for WIT members and $75 for nonmembers. The price also includes workshop materials and luncheon.

Network from **page 19**

does not have the proper diagnostic tools to give evidence of conditions, PDR will be hampered.

The weakest links in the PDR chain become obvious during live outages. To make the most from each outage experience, the communications manager needs to conduct a postmortem session with the technical staff and assess the process.

The following questions must be addressed in this session:

- Were the diagnostic tools adequate in providing coverage to the areas that needed to be tested?
- Did the process falter because of an individual or collective lack of knowledge in running or translating test results?
- Did the formulation of hypotheses and subsequent testing follow general deductive or inductive reasoning principles?

Answers to these inquiries can only help strengthen the communications group's ability to face inevitable future outages with faster problem resolution.

NEW PRODUCTS AND SERVICES

See inside for:
- ▶Twisted-pair local network
- ▶File exchange tool for packet nets
- ▶Fiber data link

▶AMERICAN TELESYSTEMS CORP.

Message system out

Works with most PBXs, Centrex.

ATLANTA — American Telesystems Corp. has announced an electronic message system that allows an operator to route incoming calls to devices supporting text or voice messages.

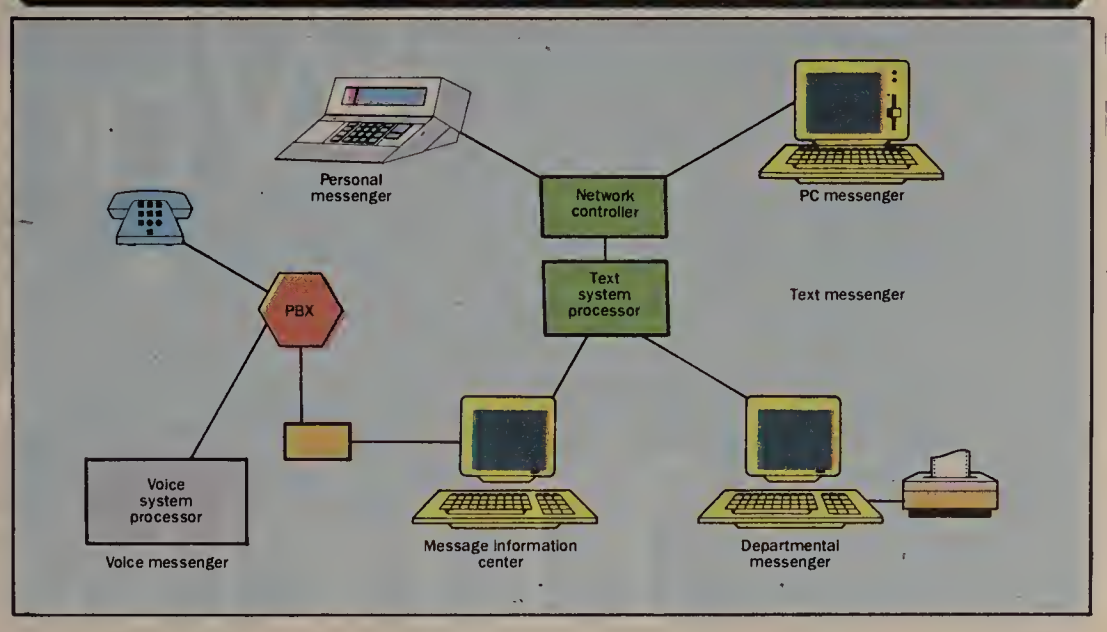
The three-component Express Messenger system is compatible with most private branch exchanges and Centrex services. The heart of the system is the Message Information Center workstation from which an operator takes messages and channels them to either a text or voice processor. Incoming calls reach the Message Information Center if the line being called is busy or does not answer after a specified time period.

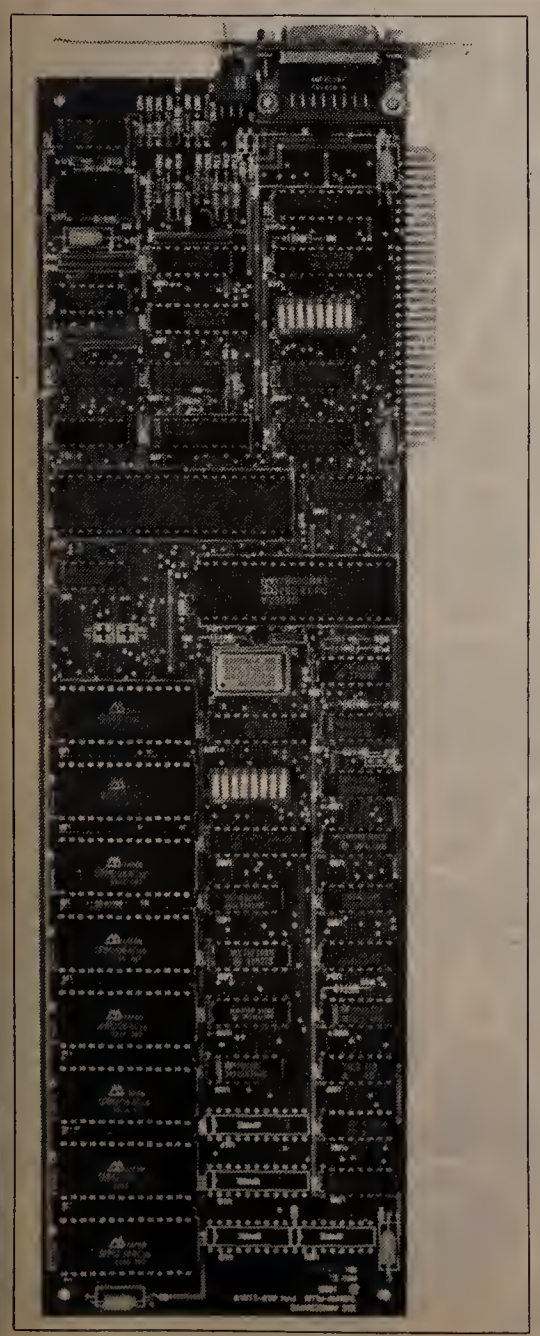
Upon receiving a call, the Message Information Center operator accesses a personal computer-based file detailing information on the person trying to be reached. That file contains daily schedules and any special instructions concerning how incoming calls to that line should be handled.

The operator answers screen prompts by striking programmed keys to create standard text message responses, or he may create more detailed messages directly from the keyboard. The operator can also transfer the caller to an

See **Express** page 23

Routing plan of the Express Messenger system





▶TERMINAL EMULATOR

Software supports System/30 series minis

Enables four PCs to mimic IBM 5251.

BY JIM BROWN
New Products Editor

BILLERICA, Mass. — IDEAssociates, Inc. introduced a terminal emulation program that enables up to four IBM Personal Computers to mimic IBM 5251 terminals.

The IBM 5251 terminal is used for the company's System/34, System/36 and System/38 minicomputers. The software package, called Ideacom 5251/Share, runs on an Ideacom 5251 expansion board.

With the product, one personal computer acts as a communications server and accesses an IBM System/30 series minicomputer. Three other personal computers can be connected to the server by RS-232 cable or an asynchronous modem.

The company also enhanced its 5251 expansion board. The board now supports IBM 3180 terminal emulation and a windowing capability that enables a personal computer to support up to four concurrent IBM 5251 terminal emulation sessions. The company claims to be the first vendor to offer windowing capabilities in the IBM 5251 terminal emulation market.

The Ideacom 5251 expansion board connects to the System/30 series minicomputer through a 1M bit/sec twin-axial cable link and supports file transfer when used with IBM's PC Support/36 or PC Support/38 software.

With Ideacom 5251/Share, each personal computer, including the device hosting the Ideacom 5251 board, has access to one 5251 display session and one IBM PC-DOS application.

Hard copy printouts of files are provided by sending print commands to a printer attached to the personal computer hosting the Ideacom 5251 board or to a System/30 series attached printer.

IDEAssociates Project Manager Leslie Lord said the software program installation has been made simple through the use of user-friendly prompts asking how the system is to be configured. She said

See **IDEAssociates** page 23

▶LOCAL-AREA NETS

Bridge spans link gap

Joins 3270s to IBM and async hosts.

BY MARY PETROSKY
West Coast Correspondent

MOUNTAIN VIEW, Calif. — Bridge Communications, Inc. last week unveiled a local-area network server that allows IBM 3270 terminals to be linked to both IBM and asynchronous host computers over an Ethernet local net.

The Communications Server/1-3270 (CS/1-3270) provides protocol and code conversion, enabling IBM 3270-type synchronous terminals to emulate displays used with asynchronous Ascii minicomputers like those provided by Digital Equipment Corp. and other vendors. Users of 3270 terminals can also access peripherals such as shared modems via the new server. A spokesman said the server makes the IBM terminal appear as a DEC VT100 terminal to a DEC VAX mini.

> *"Users of 3270 terminals can also access peripherals such as shared modems."*

In addition to accommodating a variety of IBM or compatible terminal types, including the IBM 3278, 3279, 3178, 3179 and 3180, the CS/1-3270 supports IBM 3270 Personal Computers and microcomputers equipped with Irma 3270 emulation cards from Digital Communications Associates, Inc.

The CS/1-3270 currently supports the Xerox Network Systems (XNS) and Department of Defense Transmission Control Protocol/Internet Protocol (TCP/IP) protocol sets.

Versions of the server are also planned for the IBM Token-Ring Network and broadband networks. Each server can support from eight

See **Bridge** page 23

PRODUCTS & SERVICES

Twisted-pair local network

A local-area network that supports twisted-pair wiring, does not require a file server and supports up to 255 devices was introduced by **Kimtron Corp.** The company also announced a series of IBM-compatible workstations.

By providing IBM Network Basic I/O System (Netbios) interface emulation, **K-Net** can support IBM PC Network- or IBM Token-Ring Network-compatible software. Any multiuser application written for PC-DOS Release 3.1 will run on the K-Net as well.

Each personal computer accesses K-Net through a half-sized expansion board, which incorporates very large scale integration technology and an RJ-11 jack.

Every device on the K-Net can request and receive connection to the resources — including unlocked files and data bases — of any other device on the network. In addition, the resources of hard disk and tape backup subsystems, printers, plotters and modems connected to a personal computer on the network can be shared by each personal computer on the network.

The K-Net uses a bus topology stretching for up to 4,000 feet with repeaters. It supports a 1M bit/sec data transfer rate without the need for a file server.

K-Net hardware and software lists for $395 per connected device.

Kimtron spokesmen said they are developing compatibility with Novell; Inc.'s Advanced Netware.

The firm also announced three IBM Personal Computer-compatible workstations called the KW series. Each member of the family is a diskless workstation outfitted with a local-area network interface card capable of remotely booting into the K-Net. All three models come with eight expansion bus slots, a monochrome monitor with video adapter card and an IBM Personal Computer AT-compatible keyboard.

The $995 **KW-1** has an Intel Corp. 8088 microprocessor with a 4.77-MHz clock and has 512K bytes of random access memory (RAM). The $1,195 **KW-2** uses Intel's 8088-A microprocessor with an 8-MHz clock and has 512K bytes of RAM. The $1,995 **KW-3** is based on Intel's 80286 microprocessor with a switchable clock speed of 6 MHz or 8 MHz and 640K bytes of RAM.

Kimtron Corp., 1705 Junction Court, Bldg. 160, San Jose, Calif. 95112 (408) 436-6550.

File exchange software

McDonnell Douglas Applied Communications Systems Co.'s Tymnet X.25 public packet-switching network now supports file exchanges between remotely located personal computers.

The company's **Filexchange** software operates on IBM Personal Computers with 256K bytes of memory and IBM's PC-DOS operating system Release 2.0 or higher. The package allows users to send data files to a central repository through a modem hard-wired to the Tymnet X.25 public network. Other Filexchange users then retrieve the file from the repository.

Users can determine the character length of a file in advance and estimate the cost of sending it. Another option allows users to schedule unattended file transmissions during off-peak hours.

Charges for the file transfer package include a $300 monthly subscription fee for space on the central repository and a one-time $99 fee for the personal computer software.

McDonnell Douglas Applied Communications Systems Co., 20705 Valley Green Drive, Cupertino, Calif. 95014 (800) 435-8880 ext. 62.

Fiber link

Raycom Systems, Inc. introduced a fiber-optic link compatible with IBM coaxial cable connections.

The **Raycom 3200** fiber data link system converts coaxial cable to fiber cable transmission media and converts fiber back to coaxial. The system can be used for connections between IBM 3278 terminals and IBM 3274 or IBM 3276 communications controllers. It can also be used to connect terminals or local IBM Model 3299 multiplexers to a remotely located multiplexer.

The Raycom 3200 transmits at speeds up to 2.35M bit/sec over distances up to 1.5 miles. Optional configurations include fiber links up to 11,500 feet and a board level product to be installed in terminals, multiplexers or controllers.

Raycom 3200 costs $695 a pair.

Raycom Systems, Inc., 6395 Gunpark Drive, Boulder, Colo. 80301 (303) 530-1620.

Express from **page 21**
IBM Audio Distribution System-compatible Voice Messenger component that is also directly accessible from any push-button phone.

Text messages are passed to a text processor, which then hands them off to either a Departmental Messenger unit, supporting up to 44 users on a single terminal, or to a network controller, supporting up to 192 individual Personal Messengers or personal computer-based Messengers.

Departmental Messenger users can prompt the terminal to print out any messages for them on an attached printer. Users also enter their daily itinerary or instructions concerning awaited calls on the Departmental Messenger terminal, which relays the information to the Message Information Center.

Individual text messages are received through a desktop Personal Messenger unit or an existing personal computer supported by a number of common communications software packages. The Personal Messenger's four-line screen displays up to 40 characters.

> *"Users can prompt the terminal to print out any messages for them."*

The Personal Messenger features a personal telephone directory, speed dialing, a calculator, a clock/timer and an intercom. The device has nine function keys and a 12-key telephone pad. Personal computer-based Messengers offer calendar, notepad, reminder list and local-information retrieval package features in addition to the features of the Personal Messenger.

The entry-level Express Messenger system contains two Message Information Centers, four Departmental Messengers with attached printers, Departmental Managers or Network Controllers, a text processor, a hard disk, software and a communications adapter that supports a mix of up to eight Message Information Centers. The price of the system is $25,000. A network controller supporting a mix of up to 192 Personal Messengers or personal computers lists for $995. Each Personal Messenger costs $495.

A Voice Messenger that supports up to four telephone lines and 100 users with up to 56 hours of recording on a 700M byte hard disk can be added to the Express Messenger system for $25,000. A fully configured Voice Messenger supports up to 16 telephone lines and 1,000 users. It is priced at $60,000.

IDEAssociates from **page 21**
the software installation takes roughly five minutes.

The Ideacom 5251/Share product, Lord said, is being targeted at personal computer users who occasionally access an IBM System/30 series minicomputer.

The IBM 3180 terminal emulation capability added to the Ideacom 5251 board will support applications that present data in up to 132 columns. It will also allow the personal computer user to configure a personal computer keyboard layout to that of an IBM 3180 terminal or IBM 5251 terminal.

> *"It is targeted at users who occasionally access a System/30."*

The product is being marketed with three purchase options. The first option is a complete package priced at $1,495 and comprised of an enhanced Ideacom 5251 board, Ideacom 5251/Share software and an Ideamini half-sized personal computer expansion board supporting two serial ports and cable. Other options include purchasing the enhanced Ideacom 5251 expansion board for $895 or purchasing a $495 Ideacom 5251/Share software package to upgrade current Ideacom 5251 expansion boards with the multiple user features.

Bridge from **page 21**
to 32 IBM coaxial Category A display ports, with additional ports added in increments of eight. The CS/1-3270 supports up to eight sessions per port, a total of 96 sessions for the entire device, so users can switch between multiple IBM sessions or between IBM and other host sessions. Terminals can be located up to 4,000 feet from the communications server.

The server is priced at $20,800 for the 32-port configuration, plus a software license fee of $150 for XNS protocols or $250 for TCP/IP protocols.

TECHNOLOGY

JEFFREY ROTHFEDER

Fiber vs. satellites

In late 1988, the ribbon will be cut on the first commercial transoceanic fiber-optic communications link. Transatlantic-Transmission 8 (TAT-8) will travel 3,145 grueling nautical miles from Tuckerton, N.J., to the European continental shelf. The trip will cost its backers — AT&T and 28 other telecommunications companies in the U.S. and Europe — $335 million.

Speaking purely about its technology, TAT-8 is a marvel, principally the result of advances in repeater and branching research. Its repeaters, or regenerators, which refresh the laser communications signals, are so powerful that they're able to be spaced a hefty 50 kilometers apart and are built to withstand the pounding of the ocean. For the first time, the branching of undersea cable will be possible, so that two landing points, one in France and the other in the UK, are planned.

Beyond the significance of its technology, the imminent arrival of TAT-8 raises an important question for communications managers: Is fiber optics a better medium for international video, data and voice corporate networks than satellite transmissions? The answer lies in a mixture of performance and economic trade-offs and in owning a particularly clear crystal ball to depict the future.

> *"Speaking purely about its technology, TAT-8 is a marvel."*

In terms of pure performance, TAT-8 will outpace the satellite as a transatlantic communications medium. The time lags that mar satellite transmissions are not a problem over optical fiber links, and there is virtually no electrostatic interference on a fiber-optic cable.

However, satellites are a more flexible communications medium. A transmission sent overseas via fiber optics would have to be transmitted again to its terminus by some other medium — terrestrial or satellite — once it reaches Europe; a satellite broadcast, on the other hand, can go directly to its destination.

In terms of the cost of raw bandwidth, satellites again appear to have the edge over TAT-8 for international corporate networking. A recent study by Intelsat shows that the price of a transmission circuit on the next-generation Intelsat 6 satellite will be $1,133, compared with $1,596 on TAT-8. This is a significant difference for a customer with large networking needs.

TAT-8 and satellites are equally flawed media when used for an application that is high on many corporate wish lists: video transmissions. Although real-time 150M bit/sec broadcast-quality video can be transmitted over either a typical satellite channel or the 296M bit/sec TAT-8, that amount of bandwidth doesn't come cheaply. To make video transmission affordable for most corporate applications, the video must be sharply compressed, and that compromises quality. And the cost of compression and decompression equipment required at either end of a communications link eats into the cost savings gained by using less bandwidth on a satellite or fiber-optic cable.

Although satellites appear to have the edge right now, here's where accurate crystal-ball gazing becomes a necessity: Several trends indicate that before the 1990s are over, fiber optics will prevail over satellites as a cheaper, higher quality medium for international corporate networking.

First, there is the serious supply and demand crisis that the satellite industry is expected to face by 1995. According to a market report prepared jointly by the Center for Space Policy, Inc. and Shearson Lehman/American Express, Inc., satellite capacity will reach a peak by 1992. At that time, nearly 4,000 transponders will be available to satisfy a market demand of only

Rothfeder is a free-lance writer based in Wyckoff, N.J.

WASHINGTON, D.C.

ALAN PEARCE

How to regulate deregulation

A new regulatory framework is to be imposed on the telecommunications and information industries by the Federal Communications Commission between now and 1988 — and nobody likes it.

As with most things that are new and different, there is a great deal of hostility and fear regarding the FCC's attempt to release the Bell operating companies and AT&T from the structural separation requirements established in the Second Computer Inquiry. The FCC will impose upon them a new Uniform System of Accounts (USOA), along with accounting and cost allocation rules designed to separate the costs of regulated services from unregulated business activities.

Three major rule-makings embody the essence of the new regulatory framework. They are: the Third Computer Inquiry, CC Docket 85-229; the Uniform System of Accounts, CC Docket 78-196; and the Accounting and Cost Allocation Inquiry, CC Docket 86-111.

Enough policy was enunciated in all three of these rule-makings to give the industry a glimpse of the future regulatory structure of the telecommunications industry as it careens into the 1990s.

The recent decision in Phase I of Computer III hints at the integration of these three dockets. The Computer III decision accomplished two major FCC policy goals. First, it put forth a complicated new framework for determining the degree to which various types of services offered by the BOCs and AT&T should be regulated — as opposed to deregulated. There lies the disappointment. Secondly, it mapped out short-term evolutionary modifications of the Computer II rules to address some immediate problems confronting AT&T and the BOCs.

Generally speaking, the new regulatory framework will place a heavy reliance on FCC-approved open network architecture plans and on the submission of tariffs on an unbundled basis. Also, both AT&T and the BOCs must submit themselves to detailed accounting and cost supervision, to be stringently laid down by the FCC, most notably in CC Docket 86-111.

In the interim, the BOCs and AT&T can only offer deregulated services outside of their subsidiaries, provided that they file approved open architecture plans and associated tariffs, file detailed accounting plans and adhere to other regulatory requirements imposed upon them by the FCC.

The Computer III, Phase I policy becomes effective some time in 1988. The Phase II policy has just been launched, and it attempts to resolve some outstanding issues regarding network channel terminating equipment, the regulatory framework to be imposed upon the independent telephone companies and whether Computer III policies should be extended internationally.

The new USOA in CC Docket 78-196 is very closely related to Computer III and CC Docket 86-111. The new USOA will become effective on Jan. 1, 1988, the same year that the new Computer III policies will be imposed, and not coincidentally, the time frame predicted for imposition of the new accounting and cost allocation rules.

The new USOA rules provide for a financially based accounting system that reflects functions that recur in providing products and services to customers. In other words, USOA is like the construction of a new regulatory building, while CC Docket 86-111 will determine what fittings and fixtures will be placed in each room.

CC Docket 86-111 is the FCC's attempt to link the USOA to Computer III policies by deciding how the regulated telephone companies should separate the costs of their regulated activities from their unregulated activities. The FCC has already developed detailed cost allocation proposals and standards, along with stringent oversight mechanisms. Comments on this rule-making are currently pouring into the FCC.

All sides are disappointed about these three issues. The so-called dominant carriers, AT&T, the BOCs and some of the major independents, are beginning to see that all of this talk about deregulation is just that — talk. The three rule-makings draw a regulatory map from now to infinity, unless Congress decides to give the telephone companies significant deregulatory freedom, and there is little chance of that.

Competitors claim that the FCC is not up to regulating the dominant carriers and that accounting and cost allocation rules simply are not effective at eliminating cross-subsidies and predatory pricing.

Meanwhile, the FCC continues to march boldly on, apparently unaware or unafraid of the storm that rages. Critics from both sides appear to ignore some fundamental regulatory principles embodied in the Communications Act of 1934, which is still the legisla-

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Pearce is president of Information Age Economics, Washington, D.C.

> *"In the long term, fiber optics appear to be a better choice than satellites."*

about 3,000 transponders. Though demand will continue to rise, the report predicts, available capacity will tumble between 1993 and 1995 as many of the spacecraft currently in orbit reach the end of their design lifetimes.

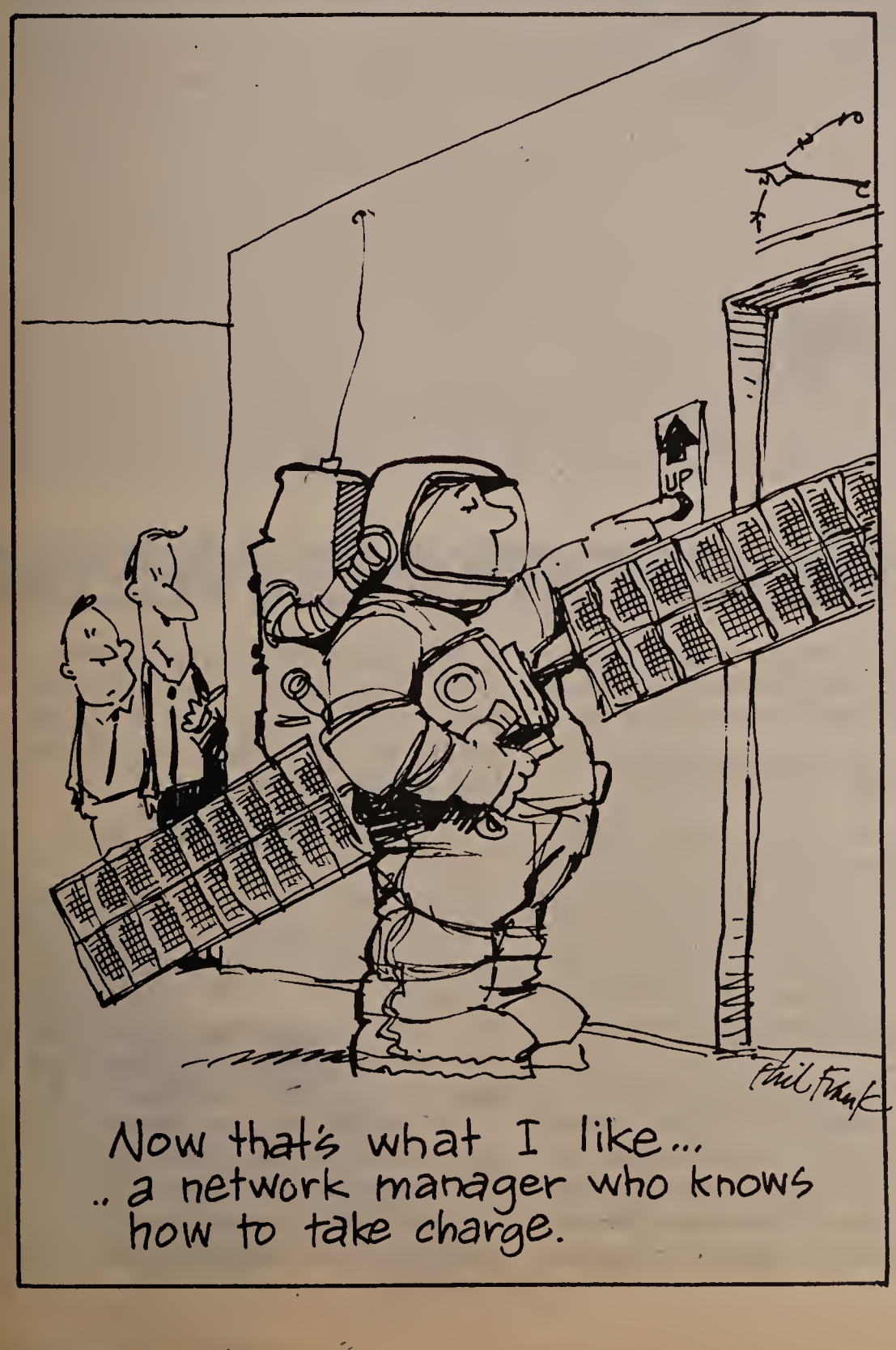
The slowdown in National Aeronautics and Space Administration (Nasa) launchings, coupled with the recent failure of a French Ariane space launching, will also contribute to a capacity decline. Overall, this indicates a rapid rise in prices for satellite capacity.

While satellite prices are ballooning, the cost to install fiber-optic cables is expected to drop precipitously as their components finally become standardized. Everything from the bit rates used for video, data and voice to the design of switching devices is now not uniform. However, international standards-setting bodies such as the Consultative Committee on International Telephony and Telegraphy are working feverishly to ensure that future fiber-optic designs meet certain standards so that the wheel is not reinvented each time a lightwave system is put in place.

Finally, technological breakthroughs in fiber optics are occurring at a faster pace than in satellites, which will translate into even more cost savings for end users. Navy researchers recently developed an experimental optical fiber so efficient that it could be used for transoceanic communications with few repeaters, if any. It is estimated that the full-scale use of this powerful cable would lower the price of installing a system such as TAT-8 by as much as 40%.

Thus, in the long term, fiber optics appear to be a better choice than satellites for international corporate networking. However, few current satellite end users say they will be ready to jump ship when TAT-8 is finally completed. Only companies that are willing to make decisions based on facts and figures — and gut instincts — will make the right choice and prosper from it.

▶ TELETOONS — By Phil Frank



INTERNATIONAL COMMUNICATIONS

STEVE MOORE

South of the border

Consider the plight of communications managers in South American countries like Argentina or Brazil. There, an executive in the offices of a large multinational corporation in, say, Buenos Aires, may have as many as 20 telephones on his desk.

Not only that, but lines from each of those 20 phones, as well as from hundreds of other individual phones throughout the building, may run up and out from the roof of the building into a vast spiderweb of cables strung throughout the business district. The cables are installed using special guns that literally shoot them from one rooftop to another. Many such cables are not only themselves illegal, but are strung illegally by moonlighting employees of the government-controlled telecommunications authority.

All this is according to Paulo Glikas, a marketing manager at the New York offices of CMA, Inc., a networking services and equipment company headquartered in Sao Paulo, Brazil. CMA sells its South American expertise to U.S. multinationals that are tapping the growing markets for U.S. goods and services in large South American cities.

As Glikas tells it, telecommunications in South America is perhaps the most bizarre mix of differing technologies and government regulations of any continent on earth. He advises U.S. companies that want to network south of the border to work with consultants and installers that have local political connections. Otherwise, negotiating for services with South American Postal Telephone and Telegraph authorities can be an excruciating process.

"Once you order a line in Buenos Aires," notes Glikas, "it may take up to eight months before that line is installed by [the Argentine PTT] Entel." To combat this delay, most businesses hire people to string private lines from one location to another. Buenos Aires has tens of thousands of cables, some as large as 1,000 pairs per cable, stretching from one roof to another. "To install a line this way takes only a matter of days," he says.

"Please note," Glikas continues, "that each line installed under these conditions carries a monthly maintenance fee, and it is normal to have low-quality cables and problematic lines. The customer must pay for fixing a line, and the costs may run high while you wait for our official line to be installed by Entel."

Although equipment used in each country must comply with Consultative Committee on International Telephony and Telegraphy technical standards, restrictions on importation and use of specific communications devices vary widely. Many countries — Brazil being the most hard-nosed on this — insist that all equipment they allow to be attached to their networks be bought from local manufacturers.

Some governments restrict technology arbitrarily. "In Chile, it is illegal to connect any modem over the telephone lines that has a [transmission] capability greater than 300 bit/sec," Glikas says.

Corruption is another problem. Though Glikas says some governments are striving to eliminate such practices, bribery is still widespread as a means of obtaining service or of convincing an official to look the other way when an illegal line is installed or an illegal device is in use. At the same time, some government officials themselves rely on illegal telephone lines.

Moreover, observes Glikas, "Governments in South America may leverage availability of communications to an American firm as a means of relieving pressure from their debts." It is well known that South American nations, Brazil foremost among them, owe astronomical debts to American banks and to foreign companies. South American governments, Glikas says, may take the position that access to communications should be considered as partial repayment of a debt, or as a bargaining chip in reducing tariffs on their exported goods.

Failure to be sensitive to cultural differences in the way business is conducted can be a major obstacle to setting up South American networks. Companies in Brazil prefer a more personal approach to business than is common in the U.S., Glikas says, and have not yet chosen to participate in the 24-hour day that technology is fostering between other regions of the world, such as North America and Western Europe.

Moore is features editor for Network World.

See **South** page 42

WHATEVER YOUR NETWORKING NEEDS,

WE MAKE THE PIECES FIT.

Maybe it's simply linking all the personal computers in one department so they can share information.

Or perhaps it's giving a PC in sales access to the mainframe in accounting.

Or opening the lines of communications between equipment made by different manufacturers.

Or maybe it's accessing a mini on the West Coast with a terminal on the East.

Or maybe...we could go on and on, but you get the idea. In order to get the most out of the equipment you've invested so heavily in, the pieces have to work together. But there's no one simple networking solution because there's no one simple networking problem.

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Now let's say you want a network that extends beyond a single department. AT&T's Information Systems Network (ISN) is the answer. It not only opens up communications between our own equipment and networks, but also those of other manufacturers.

With ISN, you can connect to industry standards, like the IBM* SNA or 3270 environments. You can also bridge to Ethernet** systems. So a PC or workstation in one department can access an

AT&T HAS A NETWORKING SOLUTION.

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How is AT&T able to bring so many disparate elements together? One reason is our Premise Distribution System, our unique universal wiring scheme, composed of twisted pair and fiber optics. It's easy to install and manage, and is a long-term cost-effective alternative to bulky coax-based systems.

CROSSTOWN OR CROSS-COUNTRY.

You can also link AT&T System 85 or AT&T System 75 PBX and DATAPHONE*II 724 and 735 multiplexers to your ISN for total voice and data network integration. For a campus environment, fiber optics, T-1 facilities and AT&T's Private Microwave equipment can also feed into ISN for low-cost, high-speed data transmission.

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AT&T products have a modular design, so you can build your network one step at a time, adding and changing as your needs dictate.

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Call your AT&T Information Systems Account Executive. Or call 1 800 247-1212, Ext. 223, for the number of the sales office nearest you.

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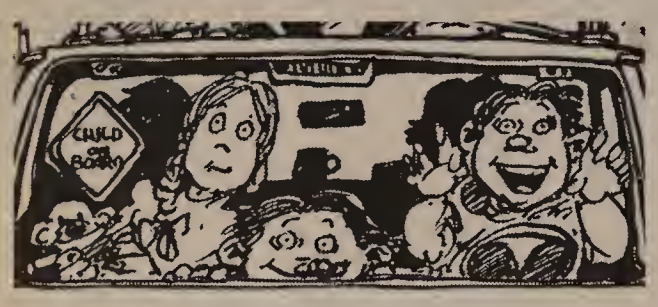
NETWORK WORLD

Features

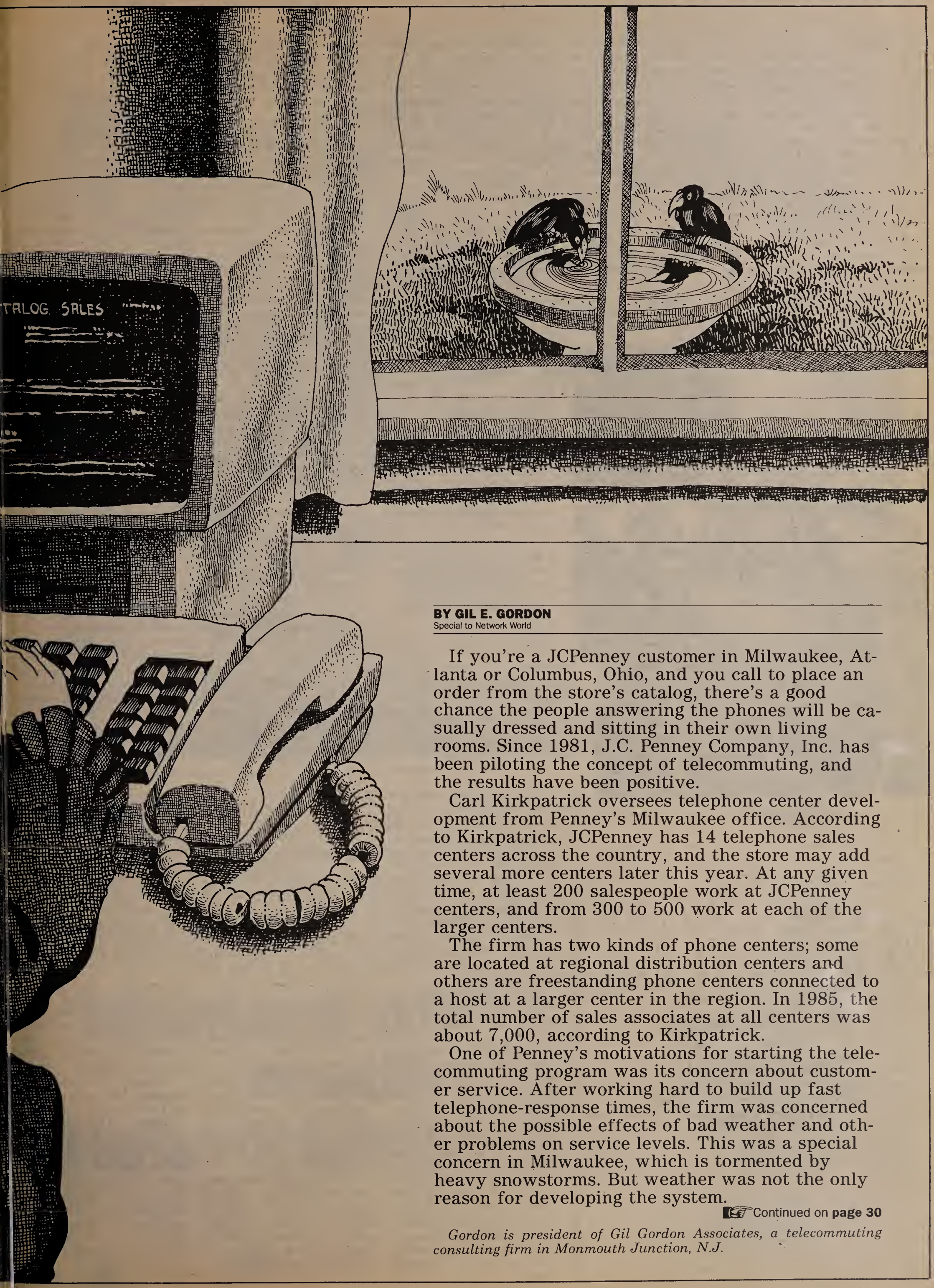
June 9, 1986



▶ TELECOMMUTING

Domestic work

Some JCPenney employees go to work without leaving home.



BY GIL E. GORDON
Special to Network World

If you're a JCPenney customer in Milwaukee, Atlanta or Columbus, Ohio, and you call to place an order from the store's catalog, there's a good chance the people answering the phones will be casually dressed and sitting in their own living rooms. Since 1981, J.C. Penney Company, Inc. has been piloting the concept of telecommuting, and the results have been positive.

Carl Kirkpatrick oversees telephone center development from Penney's Milwaukee office. According to Kirkpatrick, JCPenney has 14 telephone sales centers across the country, and the store may add several more centers later this year. At any given time, at least 200 salespeople work at JCPenney centers, and from 300 to 500 work at each of the larger centers.

The firm has two kinds of phone centers; some are located at regional distribution centers and others are freestanding phone centers connected to a host at a larger center in the region. In 1985, the total number of sales associates at all centers was about 7,000, according to Kirkpatrick.

One of Penney's motivations for starting the telecommuting program was its concern about customer service. After working hard to build up fast telephone-response times, the firm was concerned about the possible effects of bad weather and other problems on service levels. This was a special concern in Milwaukee, which is tormented by heavy snowstorms. But weather was not the only reason for developing the system.

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Gordon is president of Gil Gordon Associates, a telecommuting consulting firm in Monmouth Junction, N.J.

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A better reason for getting into telecommuting was the need to handle peak calling periods. But because the firm has since developed its own telephone network, it can shift calls from one center to another during those times. However, other benefits to the company and its salespeople have surfaced. JCPenney also sees benefits in terms of reduced office space needs, improved productivity and improved retention of employees.

The telecommuter's position is well-suited to remote work. The job essentially resides in the terminal and the telephone, making it easily transferable to a remote site. In addition, employee performance can easily be assessed.

Almost all of JCPenney's salespeople, both in the office and at home, are part-time workers. They work an average of 15 to 20 hours per week and up to 35 hours per week during busy periods. Salespeople working at home receive the same pay and benefits as their counterparts in the office, and JCPenney pays for all equipment and telephone costs. Telecommuters were selected from salespeople in the office who volunteered for the program. Kirkpatrick notes that proven job skills and experience with peak order periods, such as during holiday shopping cycles, were among the selection criteria.

Six systems

The order-entry system runs under CICS on six IBM 3033 and 3083 host mainframes located in Columbus, Ohio, Kansas City, Mo., Reno, Nev., Milwaukee and Atlanta, which has two systems. Some serve just one center and others are regional. For example, the Milwaukee center also hosts Grand Rapids, Mich., and Buffalo Grove, Ill., while the Atlanta center covers three surrounding phone centers.

The company initially used dedicated lines to link telecommuters to the local phone centers, but has since shifted to standard dial-up lines to cut costs. JCPenney has two business lines installed in each home — one for data and one for voice — so the telecommuter's personal home phone lines are normally not used.

The heart of the operation is the automatic call distributor (ACD) in each phone center. According to Kirkpatrick, the ACD treats the phone at the telecommuter's home as an off-premises extension (OPX) and controls the OPX port as if that port were a simple private branch exchange station within the telephone sales center itself.

"The cost of running that OPX line to the home has risen substantially since we started," says Kirkpatrick, "and we're trying to get around that with some new technology we have under development. We're trying to get some equipment built privately to our own specifications." Kirkpatrick declined to elaborate further on the specifics of that technology.

Telecommuting salespeople use PCI Networker terminals. Since these terminals are no longer being manufactured, JCPenney is looking for a low-cost replacement terminal with similar functions. The terminals are tied to Racal-Milgo, Inc. Vadic VA212LC modems, which feed into an IBM 3274 controller at the local phone center.

Bringing telecommuters on-line at the start of their work period is a two-step process. First, the telecommuter dials up the host and makes the data line connection for the PCI terminal. After the connection is completed, he uses the voice line to call the shift manager at the phone center to indicate that he is ready to start receiving customer calls.

The supervisor then uses the ACD software to assign permanently an incoming trunk that terminates in the ACD port to another port, which corresponds to the OPX line going to the telecommuter's home. This connection remains in place until the telecommuter calls and asks the supervisor to break the link. "It's somewhat cumbersome for us to require the supervisor to make and break the connection," Kirkpatrick says, "and that's one of the points we're trying to correct."

When a JCPenney catalog-order customer dials the local number, the call comes into the ACD on an incoming trunk. Because the OPX looks like any other station to the ACD, the telecommuter's phone is offered in rotation to that trunk. The in-home phone rings, the sales representative answers, proceeds with the order and hangs up when the order is completed.

When the telecommuter's phone is disconnected, the OPX line is idled back to the ACD, and it is then available for another incoming call.

"We originally thought we could direct incoming calls from anywhere through the ACD out to the homes," Kirkpatrick says. "We found out that the best way to use the remote sites was to put these people on trunks that are extremely busy — mostly our local metropolitan lines, where calls are coming in almost constantly." JCPenney now uses Rockwell Collins ACDs and will be converting to the vendor's Galaxy 3 model in all of its phone centers by midyear.

"The Galaxy has more options and gives us a lot more flexibility," Kirkpatrick says. "Also, it will make it easier for us to transmit data from the 14 centers to one central location."

One concern JCPenney initially had was about response time for in-home salespeople — whether the remote system could feed their screens fast enough to provide quick customer service. However, Kirkpatrick says there was no problem, even though the lines to the homes run at 4.8K bit/sec, compared with 9.6K bit/sec lines supporting the terminals within the phone centers.

"There's only one part of the order-taking cycle where there's a slight delay," Kirkpatrick explains. After the customer has given the telecommuter the order, the telecommuter proceeds to a screen covering payment method and ordering instructions. While this is happening, the IBM host checks inventory status so it can inform the telecommuter of items that are out of stock or on back order.

"That portion of the process is a bit slower because of the 4.8K bit/sec rate, but not noticeably so. I'd say we don't suffer at all by taking it down to [4.8K bit/sec]."

Kirkpatrick says JCPenney is selling its network services to other businesses. "We have the country's largest private telecommunications network, and we're going to start marketing it and go after some other business." For example, three of the phone centers — Nashville, Los Angeles, and Pittsburgh — handle telephone reservations for People Express in addition to JCPenney catalog order sales. However, at this time, none of the non-JCPenney business is done via telecommuting.

Penney's telecommuting program has worked well for the company. It is popular with employees and is transparent to customers. "If the demand on our telephone centers grows beyond our own calls and those for People Express, we're going to have to add capacity," Kirkpatrick explains. "Some of that will be in the home because we're convinced it works well for us."

> *"We have the country's largest private telecommunications network, and we're going to start marketing it and go after some other business."*

▶PRIVATE NETS

MasterCard International keeps its cardholders happy by processing more than a million transactions a day in less than two seconds each.

Masters of credit networking

BY PAUL KORZENIOWSKI
Senior Writer

ST. LOUIS, Mo. — Clad in a Mickey Mouse T-shirt and shorts, a manager, who has gladly traded in his desk for two weeks of well-earned vacation time, pulls out his MasterCard credit card to finance his stay in the Disneyland hotel. The happy vacationer does not want to spend much time waiting to check in, nor does he want to be told that the hotel is unable to authorize his transaction.

The responsibility for ensuring that the vacationer keeps his thank-God-I'm-out-of-the-office smile at least through the check-in period falls on the shoulders of Arthur W. Ahrens, vice-president of network operations at MasterCard International, Inc. Ahrens' staff must keep MasterCard's elaborate private network, Banknet, up and running so that member banks can authorize transactions.

The vacationer's transaction must be passed from the hotel to a local bank to Banknet to the vacationer's bank and then back again. Banknet has been designed to route each transaction through the network in less than two seconds.

The system has processed as many as 1.1 million transactions in one day. Even though Banknet has been up and running for less than two years, it has rapidly become one of the nation's most complex networks. Plans for the future should transform MasterCard's network into one of the world's most sophisticated.

MasterCard International is a nonprofit organization supported by 28,000 member banks scattered throughout the world. Member banks pay a monthly fee to support MasterCard International's expenses, such as a 200-person staff

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here and a national advertising budget. And they are charged for each transaction routed through the net.

Banknet evolved from three separate networks: one for binary synchronous traffic, a second for bulk data and a third for point-of-sale operations. In 1981, MasterCard decided to revamp its operations and integrate its separate facilities. Ahrens was hired in January 1984 to speed up that process, and live data was first sent over Banknet in November 1984. MasterCard has aggressive plans for further expansion in the next few years.

> *"Mastercard has aggressive plans for further expansion in the next few years."*

Banknet is principally used as a transport medium, routing transactions from one bank to another. Only in emergencies are MasterCard's IBM 4381 mainframes, located here in St. Louis, used for actual credit card authorization.

By following a typical transaction, one can understand how the network operates. A Disneyland hotel clerk calls the hotel's bank for credit authorization. If that bank issued the hotel customer's MasterCard, a bank employee can check the credit card number and determine if the transaction should be approved. If the bank did not issue the card, then the next step in the transaction approval process depends on the size of the bank. Large banks, such as Citicorp, have direct lines into Banknet's six principal nodes. Two are located in New York, and the others are in St. Louis, Cleveland, Atlanta and San Francisco. The nodes are connected to the network control center here, which routes the transaction to the customer's bank, where approval is given or denied.

Most banks do not have sufficient MasterCard traffic to warrant a direct line to Banknet. Instead, these institutions have agreements with companies that do have direct lines into the network. The 28,000 MasterCard member banks are served by 200 Banknet points of presence.

The 28,000 institutions are responsible for their own security. "We assume that any transaction that comes into the network has been cleared by the member's security procedures,"

> *"Banks such as Citicorp have lines into Banknet's six principal nodes."*

Ahrens says. In addition to these security procedures, IBM Series/1s at each member institution provide another level of transaction verification to ensure that no unauthorized transactions enter the network.

Ahrens' group does supply limited credit card authorization functions. For example, a host system at the San Francisco bank may not be operating. Transactions for that bank may be routed back to the MasterCard facility here. If the San Francisco bank had authorized MasterCard to approve certain transactions, for example, granting any transaction for less than $100, MasterCard will

check the customer's credit card number against a file supplied by the bank. If there are no discrepancies, authorization will be granted.

Authorization features are the icing on the cake that Ahrens' group feeds its users. The group's principal job is to make sure that communications lines between 28,000 member institutions remain open. To ensure the lines stay up and running, Banknet has been designed with an emphasis on redundancy. "We have a backup system for almost every piece of equipment on the network," Ahrens observes.

Each of the six key Banknet nodes is equipped with two 56K bit/sec lines and a dial backup facility that uses AT&T Wats lines. "We've found that a Wats line supplies a clearer circuit than a typical dial-up line," Ahrens says.

Hardware redundancy is supplied as well. At the central site, dual IBM 4381 mainframes share responsibility for network operation. If there were a problem with either machine; noncritical processing could cease, and one system would run the network.

The service organizations use Series/1s to format data for the private packet-switching network. The IBM minicomputers are either connected directly to a service organization's host or through a front-end processor. "The Series/1 supports various vendor connections. However, a majority of them are IBM," Ahrens says. MasterCard supplies its members with the Series/1s and the software to access the network, but the hardware is owned and the software is maintained by MasterCard. In addition, Ahrens' group is responsible for the binary synchronous connection between a Series/1 and a host.

"To ensure the lines stay up and running, Banknet has been designed with an emphasis on redundancy."

Once information has been formatted by the Series/1, it is then sent via leased lines to one of six network nodes. The 200 service organizations use leased lines, ranging in speed from 2,400 bit/sec to 28K bit/sec, to connect to one of the nodes.

Each node is equipped with a packet assembler/disassembler from BBN Communications Corp. At the nodes, data sent by the service organizations is concentrated and shipped over 56K bit/sec leased lines. These lines are networked in a star configuration that is interlaced with outside bands, or dial backup lines.

After MasterCard International has processed a day's transactions, the company has to reconcile its work. Transaction information is captured at the site here during the day and stored on the company's IBM 4381 mainframes. Batch files are sent to the member institutions during the night when network use is low.

"AT&T supplies MasterCard with all its long-haul lines. 'If we have a line problem, I want to be able to pull on only one necktie,' Ahrens notes. Racal-Milgo, Inc. modems are used by member institutions."

Response time indications captured by a network management tool from Avant-Garde Computing, Inc. are sent back on a separate leased line. "The Avant-Garde equipment is sending so much information that it just did not fit on the band to the central site," Ahrens says.

AT&T supplies MasterCard with all its long-haul lines. "If we have a line problem, I want to be able to pull on only one necktie," Ahrens notes.

Racal-Milgo, Inc. modems are used at the central site and by member institutions. Standby mo-

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dems are available at every location. Bytex, Inc. matrix switches can be used to switch in a backup unit whenever a modem malfunctions.

In addition, a spare Series/1 is stored at the site here. If a member institution has trouble with its Series/1, the company can switch to the spare here in St. Louis.

Connecting a spare modem or line is the responsibility of the network operation staff here.

The staff works in a network control center that looks more like a space agency control center than a typical data processing control site.

A map of the world spans the front wall, on which small lights represent MasterCard member banks not connected to Banknet. These banks work with dial-up or Telex lines to authorize a transaction.

Lights strung across the U.S. indicate the backbone network. The lights change colors whenever line quality is altered.

Green means the line is functioning smoothly; yellow indicates a possible alarm condition; and red shows that a circuit has been broken. Network management equipment from Avant-Garde has been tailored to drive the map.

Two long, rounded tables stretch across the room, and more than 20 screens are displayed either in front of an operator or above the two tables.

Each screen illustrates information from the various vendors' monitoring equipment. For example, one screen may have data from Racal-Milgo's network management package. Another screen is used to track the 15,000 components used on the network. For example, an analyst may want to know what type of modem is used on a certain line.

"A Series/1 is stored in St. Louis. If a member has trouble with its Series/1, it can switch to the spare."

Like many communications managers, Ahrens would like to integrate the various control screens and work with one primary package. "I'd like to be able to use one terminal to access all the network control packages," the vice-president of network operations says.

MasterCard has been working with Avant-Garde and is interested in a recent product called the Net/Command package, which is designed to supply this function. "We minal. Whether that terminal is supplied to us by Avant-Garde or someone else has not been decided," Ahrens asserts. "We may even develop our own."

Ahrens would like to see the central packages incorporate artificial intelligence capabilities. "Network-to-application transactions are being replaced by network-to-network transmissions," he says.

"It's becoming very difficult to determine where a transaction is coming from and where it is going. Yet we have to be able to isolate a problem quickly.

"With current tools, five to six minutes may be needed to isolate a problem.

An artificial intelligence package could supply a network analyst with some choices in as little as 10 seconds. That capability could speed problem determination."

"MasterCard has been working with Avant-Garde and is interested in the Net/Command package."

Another area of improvement would be defining network management standards. "Vendors all have their own way of defining what is wrong with a connection and sending network management information," Ahrens says.

"Standards could really help the integration process. However, users can't leave it up to the vendors to develop these standards. The responsibility has been placed on end users to develop a system that will present problem descriptions in a standard form."

When and if these types of standards do evolve, MasterCard seems poised to take advantage of them.

▶ CONTINUED FROM PAGE ONE

Linking Strategies

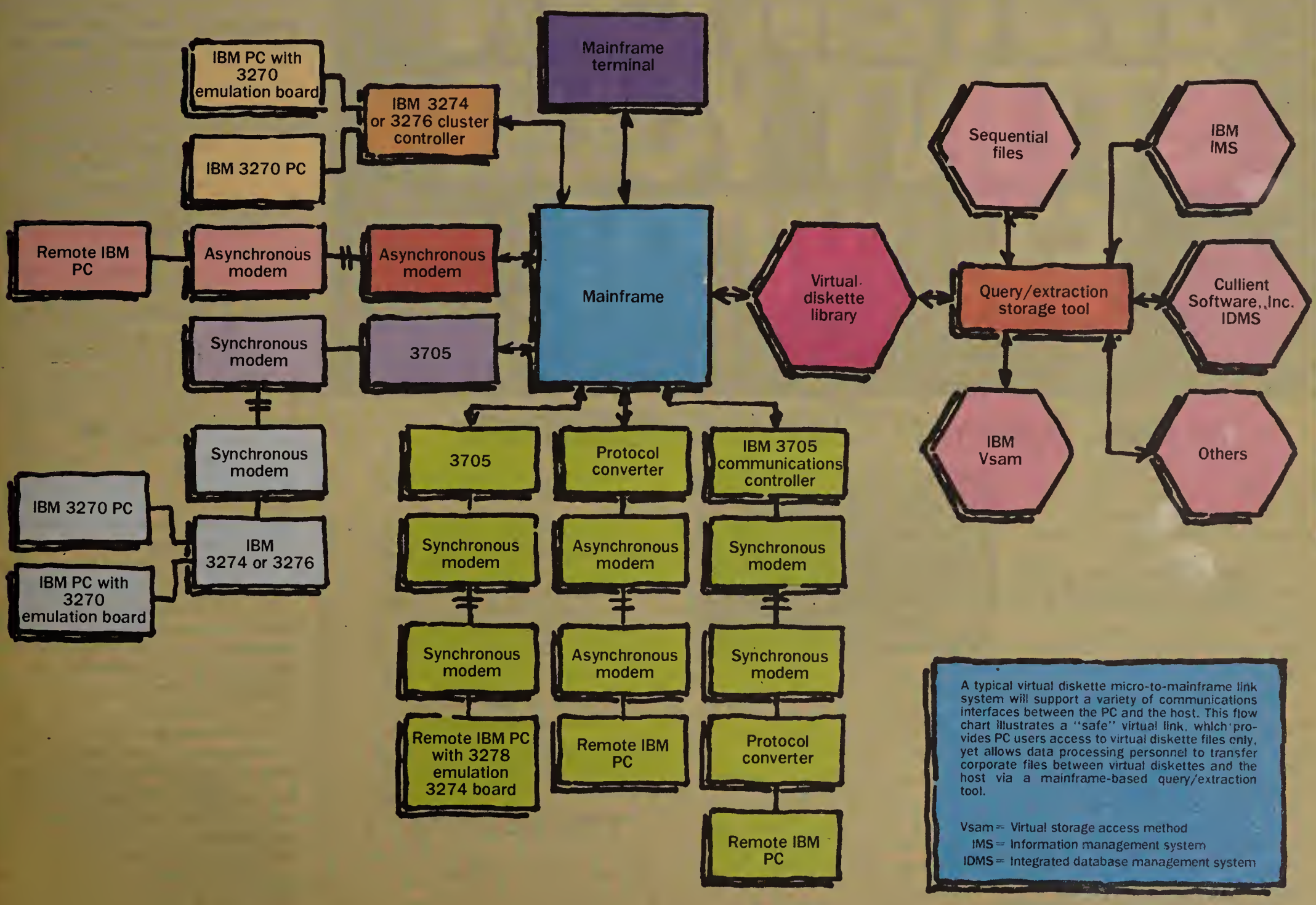
ease of use and networking capabilities are among the most important to be made before purchasing new equipment.

The three principal categories of micro-to-mainframe links are terminal emulation, integrated links and virtual disk links. The latter is emerging as a secure, reliable system that can be used alone or in conjunction with either of the other two types of links. The best way to size up virtual disk links is to compare them to the alternatives.

Products that fall into the terminal emulation category primarily provide input to an application running on the mainframe and display the output of that application or support the creation and maintenance of source and object code by programmers.

Terminal emulation boards are inexpensive and essentially allow a

Continued on **page 36**



A typical virtual diskette micro-to-mainframe link system will support a variety of communications interfaces between the PC and the host. This flow chart illustrates a "safe" virtual link, which provides PC users access to virtual diskette files only, yet allows data processing personnel to transfer corporate files between virtual diskettes and the host via a mainframe-based query/extraction tool.

Vsam = Virtual storage access method
IMS = Information management system
IDMS = Integrated database management system

SOURCE: STERLING SOFTWARE, INC., DYLAKOR DIVISION, GRANADA HILLS, CALIF.

From **page 35**
microcomputer to act like an IBM 3270 terminal. But the microcomputer and host applications cannot interact; the microcomputer becomes a dumb terminal. Some products in this category will transfer whole files between the host and the microcomputer, but these files usually cannot be formatted or converted for any particular application.

Terminal emulation, though not especially easy to use, is popular with programmers and DP personnel who are in need of an off-site means of gathering ad-hoc information and performing basic maintenance duties.

Integrated links provide the greatest power and functionality to the microcomputer. A full-featured integrated link lets the microcomputer become an intelligent workstation through which the user may do many things.

Intelligent workstation

These include automatically logging onto a mainframe; accessing a myriad of files and applications for specific pieces of information; downloading that information into one or more popular personal computer applications, such as Lotus 1-2-3 and dBASE III; modifying the information and then sending it back to the mainframe.

Integrated links are wonderful achievements, but are often shunned by prospective buyers because they sometimes will work only with a proprietary data base or other expensive mainframe software.

"Integrated links are often shunned by prospective buyers because they sometimes will work only with a proprietary data base."

Many MIS and DP managers also feel these links are too powerful and could threaten corporate data integrity.

Virtual disk links

Virtual disk links serve essentially two purposes: increasing microcomputer storage area and providing a reliable method of sharing data with a number of microcomputers.

The virtual disk system lets a microcomputer utilize the storage capabilities of a mainframe. In essence, the direct access storage device of the mainframe becomes an extension of the microcomputer, acting as an extra disk drive (see figure on page 35).

For example, if the microcomputer has two drives, A and B, the virtual drive could be C, D, or any other letter. Most virtual disk links allow for several mainframe-resident drives, each with several thousand megabytes of mass storage space.

Another key advantage of this type of system is its ability to provide a network of several hundred microcomputer users with common access to mainframe-resident virtual disk libraries.

While an integrated link user would have to search for data, download it and then somehow copy the file to others' floppy disks, the virtual disk system allows a network of users to see the data in one place.

"Access to mainframe files is a primary reason for having micro-to-mainframe links."

The inability of the system to extract data directly from mainframe files and databases is thought by some to be a drawback, but this limitation is welcomed by MIS and DP managers concerned with the integrity of their corporate data.

Transferring the data

Any virtual disk line worth its salt will provide a quick and simple method for authorized DP personnel to convert data and transfer it between the virtual disk and mainframe files.

Having access to mainframe files is a primary reason for having a micro-to-mainframe link.

Microcomputer users who are responsible for analyzing and compil-

ing data obtained from corporate data bases commonly need access to their companies' files. And without any form of micro-to-mainframe link, they would have to rekey the information from hard copy printouts.

Integrated links vs. virtual disks

Some methods of accessing mainframe databases, however, are more sensible than others. While many integrated links will allow the microcomputer user to browse through these files, most virtual disk systems do not.

Instead, they allow the microcomputer user to access the virtual disk, but not beyond. It is much safer, in terms of maintaining the integrity of corporate information, to let microcomputer users see and share specific copies of this information in a virtual disk environment than it is to let them observe — and perhaps alter — mainframe data files.

The safe transfer of data between corporate files and a virtual disk can only be accomplished, however, if the link system provides some sort of query and extraction tool that is operable exclusively at the mainframe. These tools sometimes provide access to a number of different vendors' databases and files, while others will access only proprietary systems. Still, many available virtual disk products do not provide any query and extraction tools for mainframes.

They serve as a data sharing or memory expansion device, but not as a true micro-to-mainframe link.

An example of how a virtual link with query and extraction tools, such as SYL-Vlink from the Dylakor division of Sterling Software, Inc., would work in the real world might be like this: DP personnel within a given company receive an information request from a network of microcomputer users.

These end users may need to see, for example, specific corporate information regarding sales figures of a particular region, a list of customers who typically purchase a given amount of equipment each month and so on.

Then, using a mainframe-based extraction tool, DP personnel can easily extract the required information and mount it in public virtual disks, where it is accessible and readable by one or more microcomputer users. Protected private disks, for those who wish not to share data, could also be created and guarded with passwords.

If one of the users in our example would like to make changes to the regional sales figures and then share them with other users, he can simply save the changes on the virtual disk.

Once at the virtual disk level, the newly modified information can be accessed by a number of authorized users.

This newly modified information can also be accessed at the DP center and, after having been verified for accuracy, can be transferred back to the original corporate file.

Terminal emulators and integrated links, on the other hand, allow users to access original mainframe files directly.

Link compatibility

A virtual disk link can also work well in concert with other types of links.

A company that already has a series of microcomputers connected to the host through integrated links can build a very efficient information management system by installing a virtual disk system as well.

These systems can work well together.

A single, authorized microcomputer user could utilize an integrated link for browsing through and retrieving host-based information. Once the desired information is retrieved and downloaded to the microcomputer, it could then be uploaded to a virtual disk file, where several virtual disk links could share that information with no danger of data tampering.

However, for the manager who feels more comfortable having no microcomputer connections to corporate data access, the combined integrated and virtual link is not recommended.

The virtual disk concept is a simple and safe alternative to other types of links and is practical for an organization that wants to maximize use of its mainframe disk space and take advantage of a simple, reliable networking system.

> *"Terminal emulators and integrated links, on the other hand, allow users to access original mainframe files directly."*

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David Hunter, Director of Communications, Avant-Garde Computing, Inc.

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May 23, 1986

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Publisher
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David Hunter.

David Hunter
Director of Communications

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▶ U.S. TECHNOLOGICAL ADVANCEMENT

San Diego supercomputer provides network pulse

BY ROBERT MOSKOWITZ
Special to Network World

Imagine a computer so complex it houses 65 miles of wire in a space about the size of a bread box, with no wire longer than four feet.

Imagine this system operating so rapidly that it can perform 840 million calculations per second in four separate but parallel processors, and even at this rate, half the time to process a given problem is eaten up by signals simply passing over wires.

Now imagine trying to keep this $14-million machine busy 24 hours a day, 310 to 315 days a year, amounting to about 30,000 usable hours of computing time annually.

Such a machine, the newest Cray X-MP/48, is the centerpiece of the San Diego Supercomputer Center (SDSC), which opened early in 1986 at the University of California at San Diego under a grant from the National Science Foundation (NSF).

As the largest of five supercomputer centers authorized by Congress to help keep the U.S. in the forefront of technological advancements, its biggest operational problem is shuttling information into and out of the new supercomputer quickly enough.

The strategy for solving this problem, according to Dan Van Bellegham, staff associate for networking at the NSF in Washington, D.C., is to place the San Diego supercomputer at the center of a vast, hierarchical network. This network uses a generally compatible communications protocol that can simply and efficiently interconnect dozens of major organizations and supports thousands of computers and countless computer users.

The networking protocol for all these computers is Transmission Control Protocol/Internet Protocol (TCP/IP), a public domain suite of networking protocols supported by some 60 vendors. Network software products for the supercomputer network are provided largely by The Wollongong Group, Inc. of Palo Alto, Calif., a leading supplier of TCP/IP products.

The NSF has decided to standardize on TCP/IP because it allows for open architecture and communications among heterogeneous processors.

Such open systems networking is doubly important because the new supercomputer centers are operated by consortiums of institutions, few of which have installed compatible processors or networks.

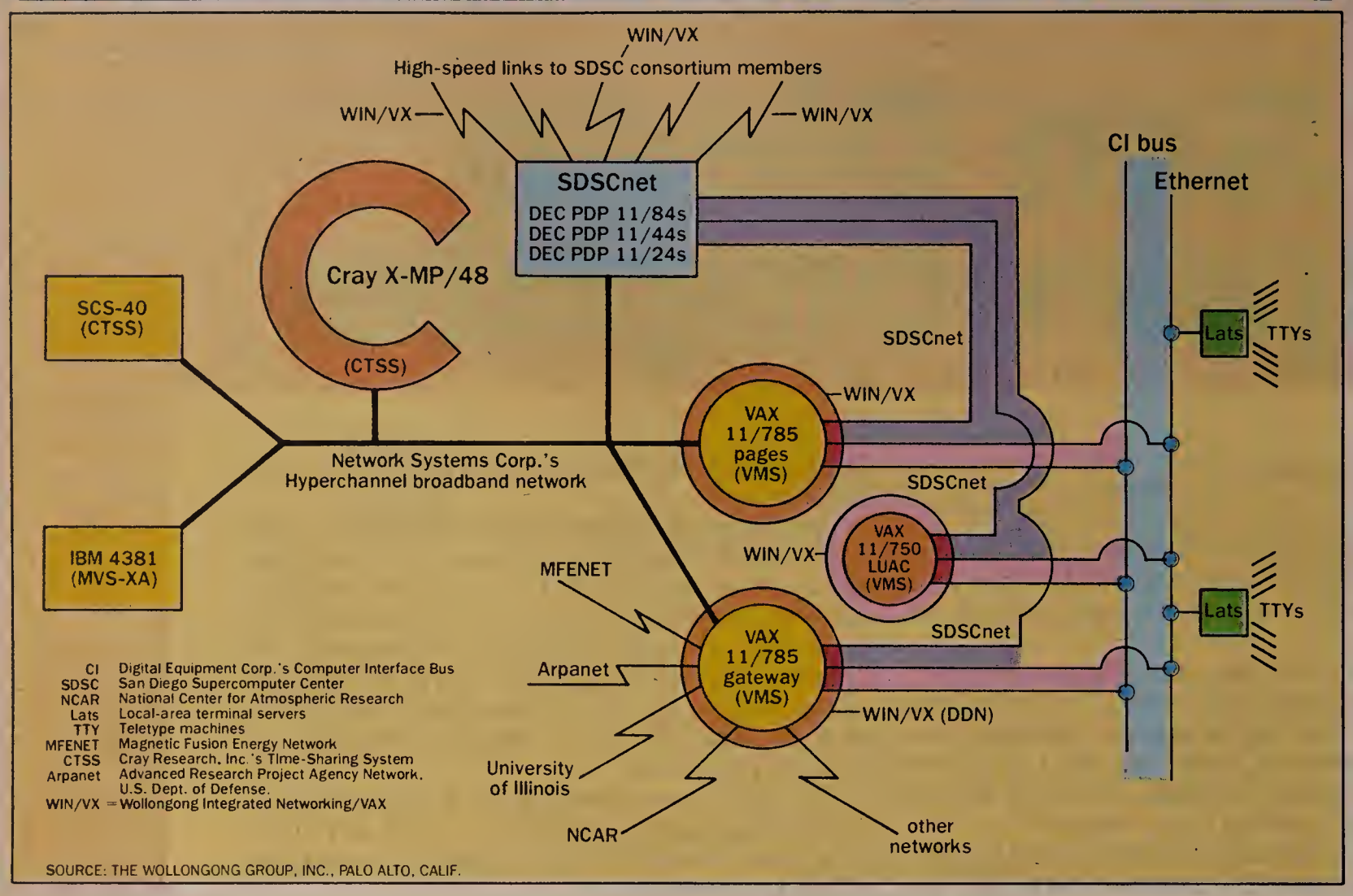
The SDSC is operated by a group of 19 nonprofit institutions and universities with diverse networking systems, including some as far away from San Diego as Tucson, Ariz., Honolulu, Salt Lake City, Seattle, Madison, Wis., Ann Arbor, Mich., and College Park, Md.

"From the beginning," says Charles H. Fox, deputy director of the SDSC, "our model at the center was to acquire proven technology. We wanted to put together a system that was pretty well demonstrated, and [we wanted to] get the whole center up and running at an early time. We're not here to invent something new. We're here to provide a supercomputer resource as efficiently and effectively as possible. Other supercomputer centers were using VAXs and TCP/IP successfully, so that's what we did, too."

☞ Continued on **page 40**

Moskowitz is a free-lance writer based in Woodland Hills, Calif.

San Diego Supercomputer Center (SDSC)



SOURCE: THE WOLLONGONG GROUP, INC., PALO ALTO, CALIF.

From **page 39**

Each consortium member communicates with the SDSC Cray through a specially built Remote User Access Center (Ruac). The Ruac is connected over a 56K bit/sec link, and because computers at both ends of the line are using Wollongong's TCP/IP software products, users have virtual terminal, file transport, remote output queuing and graphics capabilities.

A reasonably wide bandwidth is important on the supercomputer network because the typical user is transporting very large files to and from the supercomputer. At 9.6K baud, for example, such massive amounts of data take a prohibitively long time.

> *"5,000 to 10,000 users will be able to use the SDSC during its first year of operation."*

The SDSC also maintains 56K bit/sec lines to the network of the Magnetic Fusion Energy Supercomputer Center at Lawrence Livermore National Laboratory in Livermore, Calif., to the Defense Data Network (DDN), an international network, part of which is classified and part of which is not, and to the NSF's National Center for Atmospheric Research in Boulder, Colo. Dial-up access is through Tymnet at 2,400 bit/sec.

Each Ruac is based on a VAX 750 or 780, which serve as a gateway between the supercomputer network and the local-area nets, dial-up systems and dedicated lines in use at the consortium members' facilities. Thus, a user in his office at Stanford University in Palo Alto, Calif., or some other institution can use the TCP/IP protocol to ship data out over a local communications link to the Ruac, and from there to the SDSC, where it is processed by the supercomputer and returned over the same channels.

These links also serve as main trunks for supercomputer users all over the country. As many as 200 users can be supported simultaneously by the SDSC Cray. Anyone with a legitimate use for the supercomputer can apply for access to it, and users do not have to pay for their time.

Like time slots on a major telescope, supercomputer processing time is awarded by an allocation committee on the basis of the merits of the work proposed. With the network in place, users need not be at the SDSC or at any of the consortium members' sites to make use of the supercomputer's resources.

This is exactly how the NSF planned it.

"From the inception of the initiative for supercomputer centers in the U.S.," NSF's Van Bellegham says, "everyone felt there should be a small number of centers supported by extensive and highly compatible networks.

"Like all our supercomputer centers, the SDSC is intended to have the latest, fastest supercomputers available. We are funding them at a high enough level to keep them at the forefront of technology. This makes for a very expensive facility, too expensive to proliferate at every university. This, in turn, makes open systems networking necessary so large numbers of remote users can have access."

In addition to the new supercomputer at San Diego and other major universities around the country, there are data resources to be shared. Certain universities and research centers, for example, have accumulated very large files of specialized data in weather, economics, particle physics and other complex disciplines. These are valuable resources that must be made available to researchers at other institutions.

Until now, a graduate student had to be dispatched with a box of magnetic tapes containing very large data files and physically had to mount the tapes on whichever computer was to process the data. The process yielded much slower turnaround time than zapping data back and forth over a 56K bit/sec network. The new supercomputer network will eliminate most of these magnetic tape shipments.

Researchers will be able to move the required data from its origin to a supercomputer center, do the processing remotely and then move the results to their own site for analysis. At the moment, sending magnetic tapes remains cheaper. But NSF staffers think networking over satellite and fiber-optic links will create telecommunications highways that will become less expensive very soon.

To create the networking capabilities, the five new supercomputer centers, plus an already established supercomputer facility at the National Center for Atmospheric Research, are being linked into a backbone network using 56K bit/sec terrestrial lines. This TCP/IP backbone network should be operational by this summer.

By the end of the year, dozens of connections from that network will be established to regional networks or the campuswide communications systems of consortium members and other institutions. Because of the open network architecture provided by TCP/IP, 5,000 to 10,000 users will be able to use the SDSC during its first year of operation. The NSF already is contemplating upgrading to a backbone T-1 telecommunications link when and if demand requires it. Obviously, communications requirements for the supercomputer network system are extremely important.

According to Bellegham, "TCP/IP is good for us because it is vendor-independent. Regardless of the type of host mainframe a user has, it allows connection to the same network as everyone else." The U.S. Department of Defense has specified TCP/IP as the standard networking protocol for all computers connecting to the DDN.

As a result, it runs on the widest range of processors of any networking protocol now in use, including the Cray supercomputers and the VAXs that typically interface with it.

Of course, the NSF looked at other protocols. The network supporting the Magnetic Fusion Energy supercomputer, called MFENET, has been very successful, but was viewed as a modified version of Digital Equipment Corp.'s DECnet and, therefore, somewhat vendor-dependent.

Bitnet, a network connecting 300

> *"The Defense Department has specified TCP/IP as the protocol for all computers connecting to the Defense Data Network. As a result, TCP/IP runs on the widest range of processors of any protocol now in use, including the Cray supercomputers and the VAXs that typically interface with it."*

to 500 universities using a message-switching, store-and-forward technique was considered good for batch processing at 9.6K baud, but insufficient for the NSF's needs because supercomputers generate output so quickly that a larger bandwidth was needed. In addition, users generally want to use a supercomputer interactively rather than in batch mode, because it gives them back the answers so quickly.

Naturally, the NSF looked at the International Standards Organization's Open Systems Interconnect (OSI) model to see how far it had progressed. The NSF judged, however, that OSI was still four to five years away from a complete set of standards on which commercial vendors will have enough information to base their products. In this phase of development, the NSF wanted something that would allow them to start as quickly as possible, to provide remote access to the supercomputer centers and to encourage users to collaborate with one another to create an infrastructure that would make optimum use of the new supercomputer resource.

> *"The internet protocol allows information to travel through several networks as if they were all one."*

"The best feature of TCP/IP," says Bellegham, "is its internet protocol. This allows networks that are already formed to talk to one another. For our purposes, the model is one of many different research departments at a university being connected over a campus-wide local-area network and then connecting that network — which is already in place in most instances — to our backbone network. But it works just as well in commercial organizations.

"The internet protocol allows one user's information to travel through several networks as if they were all one. We didn't want to start building an extensive new physical network. We prefer to make use of networks that are already there, such as the [Department of Defense's Advanced Research Project Agency Network], parts of [the National Aeronautics and Space Administration] networks and the campus networks. With TCP/IP, you don't have to string new circuits to all the individual users within an organization. The internet protocol allows you to use the existing local net and one gateway to the new external network."

"Another advantage," Bellegham says, "is that it's a packet-switched network. This lends itself to data communications better than circuit switching, which lends itself to voice. With packet switching, a user can spend the whole day sending a file without tying up the circuit for all that time. It's like time-sharing the circuit."

Because Wollongong's TCP/IP software is consistent with the TCP/IP in Unix BSD 4.2, which is also found in System V as an option, in Cray's Unix operating system and in most other versions of Unix, it fits in with the strong trend toward Unix-based systems among the most frequent users of supercomputers. For example, many of the institutions in the SDSC consortium — including the campuswide networks at the University of California at Berkeley, Stanford University and the University of California at San Francisco — already use TCP/IP. The new supercomputer network connects immediately and directly with these networks, and facilitates the use of the supercomputer resource by people at these sites.

Although TCP/IP is the official standard for the new supercomputer network, the NSF has an eye on long-term migration toward the OSI model.

"Maybe in five years or so," says Bellegham, "we think OSI and TCP/IP will tend to merge, and stable standards will be available from OSI. When that happens, we will begin to migrate to those new standards. But today there are already a large number of users on TCP/IP. There are vendors that have TCP/IP protocols already in their software, and there are a great many TCP/IP products available. We preferred this protocol mainly because it is highly connective and usable right now.

> *"Without TCP/IP, the supercomputer network we are building would not be possible."*

"Without TCP/IP," he says, "the supercomputer network we are building would not be possible. We could do remote access, point to point to the supercomputers through the consortium networks like the one at San Diego. But this is not as useful as a system that allows for a collaborative infrastructure, where researchers can exchange ideas on code and data files and work together on projects. That is what we are building, and that is what we will have before the end of the year."

South from **page 25**

Anyone who does operate a network with links to South America must keep abreast of local regulations that may affect him.

Communications practices that are illegal one day may be legal the next, or vice versa.

"That was the case with the statistical multiplexer market in Brazil," Glikas says.

"In 1984 it was illegal to possess or own any multiplexer.

"In 1985, the government encouraged all companies to develop plans for production and massive distribution," Glikas says.

"In Brazil," he continues, "it is said that the average businessman, upon first glancing at his morning newspaper, does not look at the latest financial news or even at the sports pages. Rather, he looks first to see what laws have been changed and how this will affect him."

> *"In 1984 it was illegal to possess or own any multiplexer."*

And what is Glikas' final advice?

"That special communications manager — he who has the ability and foresight to understand his counterparts in South America, seek out local suppliers and deal rationally with what may seem to be an irrational and discriminatory system — will find that reliable communications is possible and in the end extremely profitable from a competitive point of view.'

Deregulation from **page 24**

tion that governs the telecommunications industry.

Title III of the act makes several things unequivocally clear. Service from telephone companies must be made available to everyone on an equal and nondiscriminatory basis.

Tariffs must be filed with and approved by the FCC, and the FCC can suspend tariffs almost without limit.

All common carrier contracts must be filed with the FCC, and the FCC can dictate the valuation of a carrier's property, give permission to construct facilities and govern all their transactions.

> *"Service from telephone companies must be available on an equal basis."*

The FCC also can conduct inquiries into the management of regulated telephone companies and order the filing of reports, accounts, records, memoranda and depreciation charges.

In short, Title III bluntly tells the FCC that it cannot deregulate the major telecommunications companies in this country, regardless of what types of services they are providing. So, those hoping for some regulatory relief shouldn't hold their breath.

Those who think the FCC is giving up its regulatory responsibilities should wait and see what the outcome of Computer III, USOA and CC Docket 86-111 are before they begin their complaints.

▶ SATELLITE NETS

Launch woes plague Western satellite deployment plans

BY MICHAEL FAHEY
Staff Writer

The indefinite suspension of satellite launchings ordered by the European Space Agency following the recent midair destruction of an Ariane rocket will place a premium on existing communications satellite transmission capacity, analysts said last week.

Officials at Arianespace, the French-dominated consortium of European aerospace and aviation companies selling space on the Ariane rockets, are awaiting the findings of a board of inquiry investigating the rocket's failure during a mission to launch an Intelsat V communications satellite.

Following the fatal explosion of the Challenger shuttle and subsequent U.S. rocket failures, Arianespace was the only Western agency that was available to launch satellites on a regular basis.

"There won't be an immediate crisis, but existing transponder space should become much more valuable," said Ray Fentriss, senior vice-president at Gartner Group, Inc., a Stamford, Conn.-based research firm.

Fentriss said that despite recent U.S. satellite launching failures, there had been an excess of communications satellite transponder capacity.

In fact, he said, if launchings had been successful, there could have been a glut of satellite capacity — a glut that might have resulted in lower prices to satellite users.

However, Bill Reed, director of research services at Link Resources Corp., a New York-based consulting firm, said, "It looks like the price of transponder space is going to rise pretty quickly. However, I don't think there will be a real squeeze on capacity.

"There is a lot of empty space up there," he added.

Reed and Fentriss both said the full impact of the latest rocket failure will be determined by the length of time it takes Arianespace to resume launchings.

Two-year delay possible

"We are talking about complex engineering considerations," Fentriss said. "The problem could be fixed quickly, or you could be talking about delays of 18 months or two years."

Jacqueline Schenkel, a spokeswoman for Arianespace's American subsidiary, Arianespace, Inc., said it will be at least June 30 before the board of inquiry releases its findings. And, she said, the board will be given as much additional time as it needs to conduct its investigation.

According to Schenkel, the next launch of the Ariane rocket, scheduled for Aug. 12, will most likely be delayed. She said Intelsat, whose Intelsat V satellite was destroyed when the Ariane rocket exploded, will have priority when launching operations resume.

Sigrid Badinelli, an Intelsat spokeswoman, said the satellite that was destroyed with the Ariane rocket four minutes and 30 seconds after its lift-off from the Kourou Space Center in French Guiana was intended to replace an existing Intelsat vehicle.

Intelsat presently has 16 operating satellites, providing enough capacity to meet the organization's transmission needs, Badinelli said.

▶ NETWORKING ALTERNATIVES

Second Starcom Vsat customer expands Comsat Technology's service retinue

Williams Pipeline plans to construct interactive data network.

BY BOB WALLACE
Senior Writer

ATLANTA — Comsat Technology Products, Inc. last week announced the signing of a second customer of its Starcom very small aperture terminal service at the International Communications Association (ICA) exposition here.

Williams Pipeline Co. of Tulsa, Okla., purchased two hub earth stations as well as 120 1.8-meter Vsats with which the company will construct an interactive data network. The contract is valued at several million dollars. Williams is a member of the National Telecommunications Network (NTN), based in Rockville, Md. NTN is a consortium of regional fiber-optic carriers.

Comsat Technology also announced it had inked contracts with two other common carriers that will pilot-test the Ku-band service. Comsat Technology — a wholly owned subsidiary of Communications Satellite Corp. — would not reveal the identities of the two carriers.

Like Farmers Insurance Group, Schlumberger Ltd., Federal Express Co. and Southland Corp., Williams Pipeline intends to replace many of its leased telephone lines with the Vsats. The popularity of Vsat service is on the rise as AT&T ("AT&T starts Vsat service," *Network World,* May 26) and GTE Spacenet Corp. ("Vsat services announced," *Network World,* June 2) both began offering Vsat services in the past month.

A Vsat network allows a company's headquarters to transmit and receive information from numerous geographically dispersed locations via satellite. The hub station, a large satellite earth station, is generally located close to the company's data processing center.

The Starcom service supports data transmitted in IBM's Systems Network Architecture and Synchronous Data Link Control protocols. An individual Vsat can transmit data to the hub via satellite at 56K bit/sec. Information is transmitted from the hub via satellite to the Vsats at 256K bit/sec.

The Williams Pipeline network will be unique because the company has purchased a second hub station to assure reliability of the network in case the first earth station should fail. Most companies opt to purchase only a single hub station because of the cost of stations, which range in price from $500,000 to $2 million.

Charles Zito, network products division vice-president and general manager for Comsat Technology, claimed his company would assist the petroleum company with the design and installation of the satellite network.

> *"The popularity of Vsat service is on the rise."*

"The network design is a mutual project," he said. "We provide the technical expertise and describe how our system operates, and the customer provides information about their planned applications. We implement the network, test it and turn the system over to the customer."

Williams Pipeline, however, will have to procure the satellite transponder space segment on its own. The space segment is the radio frequency the satellite uses to relay information to either the Vsats or the hub station. The company's network will be fully operational by year end, Zito said.

The Clarksburg, Md.-based Vsat service vendor began offering the Starcom service in late 1984. Halliburton Co. of Dallas signed a contract valued at $4 million to receive the Vsat service early last year. The company cited the unavailability of leased lines to several remote locations as a key reason for the switch to the Vsat service. Zito said the company's network is also expected to go into operation later this year.

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PLEASE ANSWER ALL QUESTIONS, SIGN AND DATE THE CARD.

1 My primary areas of activity. Circle ONE only.
I am involved in evaluating communications (data, voice and /or image) products and services:
1. for *use within my own* company/organization
2. for *resale* to other companies/organizations
3. Both

1a For communications, my primary responsibility is: Circle ONE only.
1. Data Communications
2. Voice Communications
3. Both

2 Circle only the ONE title classification which most applies to you.

Company Management
11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management
Data Communications
21. Management
VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
Supervisor, Head : Networking, Design, Analysis, Engineering, R&D, Applications, Services
Telecommunications
31. Management
VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks. Engineering, Design, R&D, Application Development
32. Supervisory/Staff
Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services
Factory Communications
41. Management
42. Supervisory/Staff

MIS/Data Processing
51. Management
VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other _____

3 Job Function
Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other _____

4 Which one of the following best describes the primary business activity of your organization at this location? Circle ONE only.

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/ Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other _____

5 In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services? Circle ALL that apply.
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 Check ALL that apply in columns A and B.
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

A	B	*Product/Services*
		Computers
☐	☐	01. Micros
☐	☐	02. Minis
☐	☐	03. Mainframes
		Data Communications
☐	☐	04. Communications Processors
☐	☐	05. Comm./Networks Software
☐	☐	06. Digital Switching Equipment
☐	☐	07. Facsimile
☐	☐	08. Modems
☐	☐	09. Multiplexers
☐	☐	10. Protocol Converters
☐	☐	11. Network Mgmt. & Control
☐	☐	12. Test Equipment
☐	☐	13. 3270 Controllers
		Telecommunications
☐	☐	14. PBXs
☐	☐	15. Key Systems
☐	☐	16. Central Office Equipment
☐	☐	17. Integrated Voice/Data Terminals

A	B	*Product/Services*
		Transmission/Network Services Equipment
☐	☐	18. Microwave
☐	☐	19. Satellite Earth Stations
☐	☐	20. Local Area Networks
☐	☐	21. Wide Area Networks
☐	☐	22. Packet Switching Equipment
☐	☐	23. Fiber Optic Equipment
		Communications Services
☐	☐	24. Packet Switching Services
☐	☐	25. Cellular Mobile Radio Services
☐	☐	26. Electronic Mail
☐	☐	27. Enhanced Services
☐	☐	28. Centrex

7 Estimated value of communications systems, equipment and services:
A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.
B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

A	B		A	B	
☐	☐	1. Over 10 million	☐	☐	6. $100,000-250,000
☐	☐	2. $5-10 million	☐	☐	7. $50,000-100,000
☐	☐	3. $1-5 million	☐	☐	8. Under 50,000
☐	☐	4. $500,000-1 million	☐	☐	9. Don't know
☐	☐	5. $250,000-500,000			

8 Estimated gross annual revenues for your entire company/institution:
Circle only ONE.
1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 Estimated number of total employees at this location:
Circle only ONE.
1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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Product Focus

* June 16 - 1,200 Bit/Sec Modems
* July 21 - T-1 Multiplexers
* Aug. 18 - Network Management/Test Equipment
* Sept. 15 - Broadband Local Area Networks
* Oct. 20 - Baseband Local Area Networks
* Nov. 17 - Communications Processors
* Dec. 15 - Communications Software

Special Section

* July 7 - Fiber Optics
* Aug. 4 - ISDN
* Sept. 1 - Bypass
* Oct. 6 - Local Area Networks
* Nov. 3 - Micro to Mini to Mainframe Connections
* Dec. 1 - State of the Art Users

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Wired from **page 1**
al Communications Commission wire rules," Compitello said. "It gets people very, very confused."

Compitello has challenged New York Telephone Co.'s contention that he is liable for an inside-wiring charge of $5.71 per month for each of the several thousand internal gray telephone wires supporting the company's telephone sets and data terminals.

"It could come out to 6,000 times $5.71 per month," Compitello said. "We're looking at some hefty back charges and New York Tel has concurred that, in the vast majority of cases, we have been erroneously charged." And, he continued, "There are a lot of people who have a lot more circuits than we have."

Compitello advises users who have installed their own wiring to make sure their local telephone company is not still charging for the old, replaced wire and to notify the local telephone company to stop assessing the wiring charges. "The burden of proof is on the local-exchange carrier to show that they are providing the inside wiring."

Cheryl Cushing, manager of tariff services for Connections Telecommunications, Inc., agrees with Compitello. Connections Telecommunications is a Bridgewater, Mass.-based company that provides network optimizing and tariff analysis services and products. She stressed, however, that users must take it upon themselves to notify the phone company that they are providing their own inside wiring.

According to Page Montgomery, vice-president of Economics and Technology, Inc., users should contact their local-exchange carriers or AT&T, if it is acting as their billing agent, and request an explanation of their inside-wiring plan. Montgomery said users who certify that they are providing their own inside wiring before Aug. 31, 1986, may be eligible for refunds retroactive to April 1, 1985. Montgomery said that in the case of one large user, this will mean a savings of $3 million.

Likewise, users who wish to avoid paying station message recovery charges must make sure they are exempt from the charge and the local telephone company is not continuing to charge the fee.

The station message recovery charge is included in the FCC Tariff 11, which applies to special-access services. One component of the special-access charges is a $25 per-line, per-month surcharge designed to compensate the local-exchange companies for revenues lost to so-called leaky PBXs.

Leaky PBXs are capable of routing long-distance calls over a dedicated long-distance circuit into the local exchange, thus avoiding some local telephone company access charges.

Users that are assessed the special access surcharge are also liable for a station message recovery charge of between $8 and $15 per month per line depending upon their local exchange company. "These charges are levied by default in most cases," Cushing said. "If a user calls and orders a private line, he will be assessed the charges."

Users who certify that their private lines are incapable of leaking into the local exchange will not have to pay the surcharge or the station message recovery charge.

Contel from **page 2**
from the start, and would continue to be involved throughout the project."

Neither Nill or Davidson could be specific about why the county, an IBM mainframe shop, put such emphasis on future growth of its telecommunications system. However, according to Ken Asten, a consultant at Asten & Associates of Glendale, Calif., who participated in the county's evaluation process, the county's system allows for growth, especially in the data networking area.

Meanwhile, it is unclear how the city will apply its network's integrated data, diagnostics and management features. Asten mentioned residential alarm services as one possible example. But the county has yet to select a vendor to provide it with data, terminal or residential equipment vendors. CBN views its present relationship with the county as telecommunications system contractor as a foot-in-the-door to future business, but so do the county's other information systems vendors.

Davidson said the county had been using Electronic Data Systems Corp. (EDS) to manage its data processing operations, but discontinued its relationship with EDS and hired another contractor last November.

Contel is one of the largest independent telephone companies and has, particularly since divestiture, reorganized itself to compete in the converging communications and information processing markets. According to Asten, CBN has been successful in winning recently a number of Southern California county telecommunications system contracts. CBN was formed a year ago in a wide-ranging reorganization of Contel, which included the former Contel Page's incorporation into CBN.

The initial request for proposals was issued in May 1982, and was the result of a study conducted under a county contract by Booz Allen & Hamilton, Inc., a consulting firm that also assisted the county in evaluating bids.

Locally, the county will use a combination of microwave services over its own transmission facilities, as well as public services from Pacific Bell, said Virginia Hughes, a telephone services analyst for the county.

Davidson said the county plans to integrate data on its hybrid network by the final installation phase, when the SL-100 is cut over. CBN will contract the purchase and installation of inside and outside wiring, which includes three-pair twisted wire inside, various media for outside trunks and cable and a fiber link to the SL-100.

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Ingres/Star from **page 1**
read data from multiple data bases. A second version, slated to become available next year, will support multisite data base updates, concurrent copies of data bases and gateways to other IBM Structured Query Language (SQL)-based DBMSs.

Ingres/Star is currently being beta-tested at Boeing Co., Inc.'s Aerospace Division in Seattle. Ingres/Star supports Transmission Control Protocol/Internet Protocol and Digital Equipment Corp.'s DECnet networking architectures.

On a single processor, DBMSs handle the storage, retrieval and updating of records in specific data bases. In a distributed data base environment, a user at one location could request data from other remote data bases without having to specify where the data is stored.

With the first release of Ingres/Star, users at a company's corporate headquarters would be able to view data maintained at any of the company's regional sales offices. Users would also be able to update information stored in any single data base. Future releases of Ingres/Star will allow the user to extract information from any of the regional sales offices and update information stored on all data bases. The product's data dictionary maintains information on where data is stored.

The success of distributed DBMS may ultimately rest on how well vendors understand the role played by the communications network in the use of these products. Although a distributed DBMS may work well in a company's data center, the implementation of such a product to connect remote locations will likely be affected by the communications network over which data is sent.

Peter Tierney, marketing vice-president at RTI, said communications networks will play a critical role in the success of the Ingres/Star product. Tierney said the company will not be advising users about how best to configure the communications networks over which Ingres/Star will operate.

Stewart Schuster, business development vice-president for the company, said "The communications network is the weak link in the use of the system." Mike Braude, vice-president of the Stamford, Conn.-based Gartner Group, Inc., was one of a handful of consultants who witnessed a demonstration of Ingres/Star. "RTI is sailing into uncharted waters," Braude claimed. "They'll have to work closely with their users and with independent software vendors to develop applications that will use this technology. If they don't, the danger is this could be another technology in search of an application."

To support distributed data base capabilities, each site would need a number of RTI products. All sites would need Ingres, versions of which are currently available for DEC's VMS, IBM's VM/CMS and several versions of AT&T's Unix operating system. The vendor claims a version of Ingres for IBM's PC-DOS will be announced this fall, and a version for IBM's MVS/XA will be announced early next year. The first release of Ingres/Star will only work with the VMS and Unix versions of Ingres.

Each site would also need the company's Ingres/Net product, which ties together remote data bases. Finally, each location that requires a view of remote data bases would need Ingres/Star, which is an add-on module to the DBMS software.

Ingres/Star will be packaged with Ingres/Net as an option to Ingres. Pricing for the option will range from $2,000 to $62,500.

Honeywell from **page 1**
office systems arena.

Honeywell last week unveiled its Office Network Exchange (ONE) communications architecture concept and unwrapped its ONE Plus software that supports document exchange and data base access among multivendor systems. The software runs on a newly unveiled model in Honeywell's minicomputer line, the DPS 6 Plus, and on existing DPS 6 units.

The firm also showed off a working model of its Digital Multiplexed Interface that links AT&T Information Systems, Inc.'s System 75 and System 85 private branch exchanges with Honeywell DPS 6 and DPS 6 Plus computers.

The product is expected to become available by year end. The firm hinted at a long-range strategy of offering concurrent data and voice transmission on a single twisted-pair line. That capability would further help users integrate office, telecommunications and building control systems.

The firm also announced enhancements to its Distributed System Architecture (DSA), which supports communications between IBM System Network Architecture mainframes and Honeywell computers. It also announced a communications server and two gateways for its Ethernet-compatible local-area net and a board-level product hooking its IBM Personal Computer clones, the Honeywell EP, AP and XP, to a Honeywell local net server.

Analysts say Honeywell's ONE Plus offering flows with the market tide of non-IBM vendors offering interconnections between varied office systems. But the question remains among analysts whether Honeywell has the marketing know-how and muscle to gain more than a foothold in the growing integrated office systems market.

"This could be an opportunity for Honeywell to turn some heads and perhaps become a more serious contender, but they just do not appear on the MIS director's must-see, must-listen-to list," said George Weiss, project director for small computer services with Gartner Group, Inc.

"I think they're doing a decent job of trying to pull together all their individual strengths and trying to synthesize them into a product line that has some continuity to it," said Molly Upton, an analyst with Framingham, Mass.-based International Data Corp. But, she added, "It takes more than a product to make a sale."

Honeywell's ONE architecture is designed to tie mainframes, where most corporate data resides, to remotely or locally housed departmental minicomputers through products that support standard communications protocols, including IBM's SNA, Honeywell's DSA and the International Standards Organization's Open System Interconnect (OSI) model session and transport layers. The ONE architecture also calls for departmental systems to share documents and data base extracts with terminals, personal computers and word processing systems tied together in local-area networks.

The backbone of the ONE Plus package is ONExchange, which reformats documents created on a variety of word processing packages running on IBM, Wang Laboratories, Inc. and Honeywell personal computers and word processors. Each document is stored for retrieval in revisable form in a library on the DPS 6 Plus. Later releases will add document exchange support for Digital Equipment Corp. and Hewlett-Packard Co. systems.

With the DPS 6 Plus, Honeywell cast aside its Gcos operating system in favor of the newly developed Honeywell Virtual System 6 operating system that will drive all DPS Plus machines, including the Models 410 and 420 announced last week.

Strike from **page 5**
some of their differences. The CWA is protesting so-called give-backs requested by AT&T. The union defines give-backs as previously awarded contract provisions that AT&T would like to rescind. AT&T contends that its demands are not give-backs.

CWA President Morton Bahr says AT&T is "posturing itself for Wall Street." Bahr says the telecommunications giant wants to appear to the investment community as a lean and competitive company.

Many industry and financial analysts have long said AT&T must shed its predivestiture image in order to compete in the increasingly fierce telecommunications marketplace. A key component in any AT&T cost-containment plan would be a reduction of its huge work force, according to many observers. AT&T has laid off 24,000 workers since divestiture and more layoffs are expected.

The CWA strike does not seem to have affected the Bell operating companies, although there were isolated instances where BOC workers refused to cross CWA picket lines at facilities shared by AT&T and a BOC. The CWA represents 300,000 BOC employees. Contracts for BOC employees expire Aug. 9 and contract negotiations are being handled on a company-by-company basis.

In the few plants where CWA and IBEW employees work together, IBEW workers have been honoring CWA picket lines. According to Tom Hickman, director of manufacturing at the IBEW, these are isolated instances. In most cases, the workers at individual plants are either exclusively CWA or IBEW.

At the end of AT&T's contract talks with the IBEW on May 31, union negotiators tentatively accepted AT&T's contract offer of an 8% wage increase over three years, an 8% increase in retirement benefits and a 4.5% increase in pension benefits for workers who have already retired.

The IBEW contract is expected to be voted on by manufacturing employees on June 15 and by telephone service employees on July 5, according to Hickman. He said the rank and file could reject AT&T's offer, although he termed the contract a good one.

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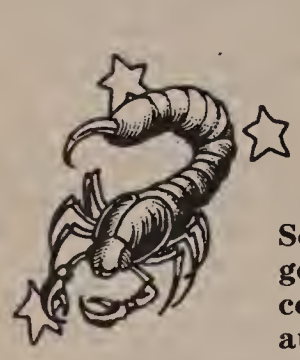
BY EDWARD HORRELL

In communications today, it takes more than good business sense to survive; it requires celestial guidance.



Scorpio: Users are getting backed into corners by venomous auditors.

More and more auditing companies, including the Big Eight accounting firms, are moving toward audits in telecommunications departments. They're looking for such things as invoice handling, call detail report integrity and disaster recovery procedures.

It's easy to see what course this starry idea will chart: Audit firms have inroads to senior management and can sell the notion of telecommunications audits. This will then cause the telecommunications department to work toward being prepared for audits. And this, in turn, will create the need for consultants to go into the audit preparation business.

Another star is born.

Gemini: Twin predictions for the biggest step forward since Touch-Tone.

Voice mail, the first telecommunications service that considers the convenience of the person receiving the call, is the latest and greatest in the telecommunications galaxy.

This comet lets the caller leave his message for delivery later, when the person being called can take it. Virtually all other telephone service is initiated at the convenience of the calling party. Voice mail caters to the called party.

And according to industry experts, a subtle shift of interest is causing major cosmic movement in the long-awaited voice mail industry.

Don Van Doren, president of Vanguard Telecommunications, says that vendors, consultants and telecommunications managers have been aware of the benefits of voice mail for some time. Only recently have the users themselves come to see the benefits. Interest is growing.

Van Doren adds that the key to success for users is the ability to change their businesses to use the advantages of delivered voice.

Two Horrellscopes predictions: First, users who don't now have voice mail will most assuredly have it sooner or later. Second, its advantages will not be seen on the balance books but in the pleased expressions of users.

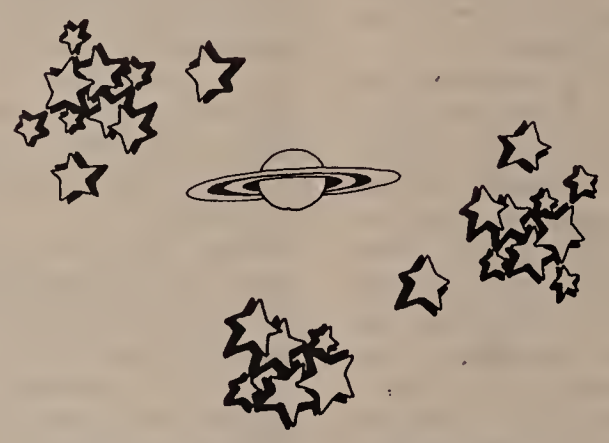
Pisces: Some fishy rumors are swimming around about British Telecom being interested in buying Tymnet from Tymnet/ McDonnell Douglas Network Systems, Inc.

Although this rumor may not be true, it sure makes sense.

McDonnell Douglas is a major plant with serious problems in its galaxy: Data processing has fallen on hard times.

British Telecom appears to be ready to make big moves toward the gold in the U.S. market. British Telecom has sold network systems but lacks U.S. marketing know-how.

This international company is not alone. The invasion of the U.S. market to take up the space left by the breakup of AT&T is serious. Are U.S. companies prepared?



Cosmic catastrophe of the month.

The goose egg for the worst idea of the month must be laid at the joint doorsteps of various Bell operating companies who can't handle what they've already got. This catastrophe began with nothing, which is the number dialed to reach an operator. This operator is now an AT&T employee — except in certain unfortunate places where the BOCs are taking back what they think is rightfully theirs.

In these places, consumers dial 0 to get a BOC operator to handle a local call. AT&T wants these consumers to dial 00 for a long-distance operator who is an AT&T employee. Many of the BOCs want 00 calls to be routed to the user's carrier of choice. Potentially, they can be lost in space, since no other carriers have live operator service.

"0 what a mess" is the most likely reaction from consumers who don't know how to call for help anymore. AT&T wanted the Federal Communications Commission to force the BOCs to adopt the 00. The FCC said no. The question is, why should anyone care? The answer is twofold. No. 1, mass confusion for users, and No. 2, these chickens eventually want to charge consumers for the use of all these goose eggs.

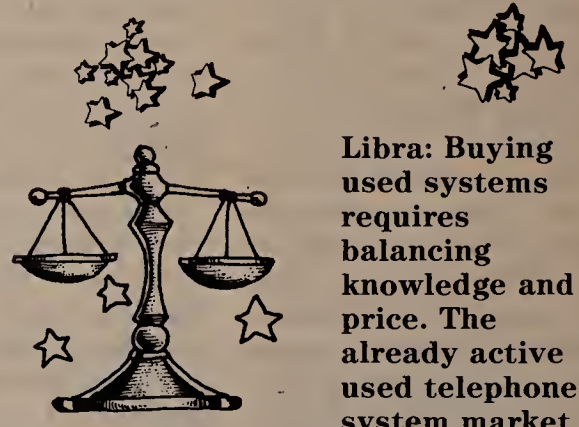
Aquarius: The sign of peace and surprise rises with AT&T's cease-fire in the private branch exchange price wars.

That great wind blowing out there is probably the sighs of relief from the PBX industry. AT&T is taking the lead in restoring services and upping prices on PBX systems. The plan is to stop the price wars that have decimated the armies of PBX companies.

AT&T's PBX division is supposedly losing lots of money and hurting the mother ship. This is a starry position many other companies can see without a telescope: Low prices have wounded a lot of companies, and profit margins are at an all-time low.

Using low prices to attract new customer bases has been hard on the consumer too. Users have paid less for less service.

Now AT&T is putting the brakes on this. The surprise is that higher prices should mean better service and more extras for the consumer, and that's always good. No improvements, and AT&T's ship will be in unfriendly zones.



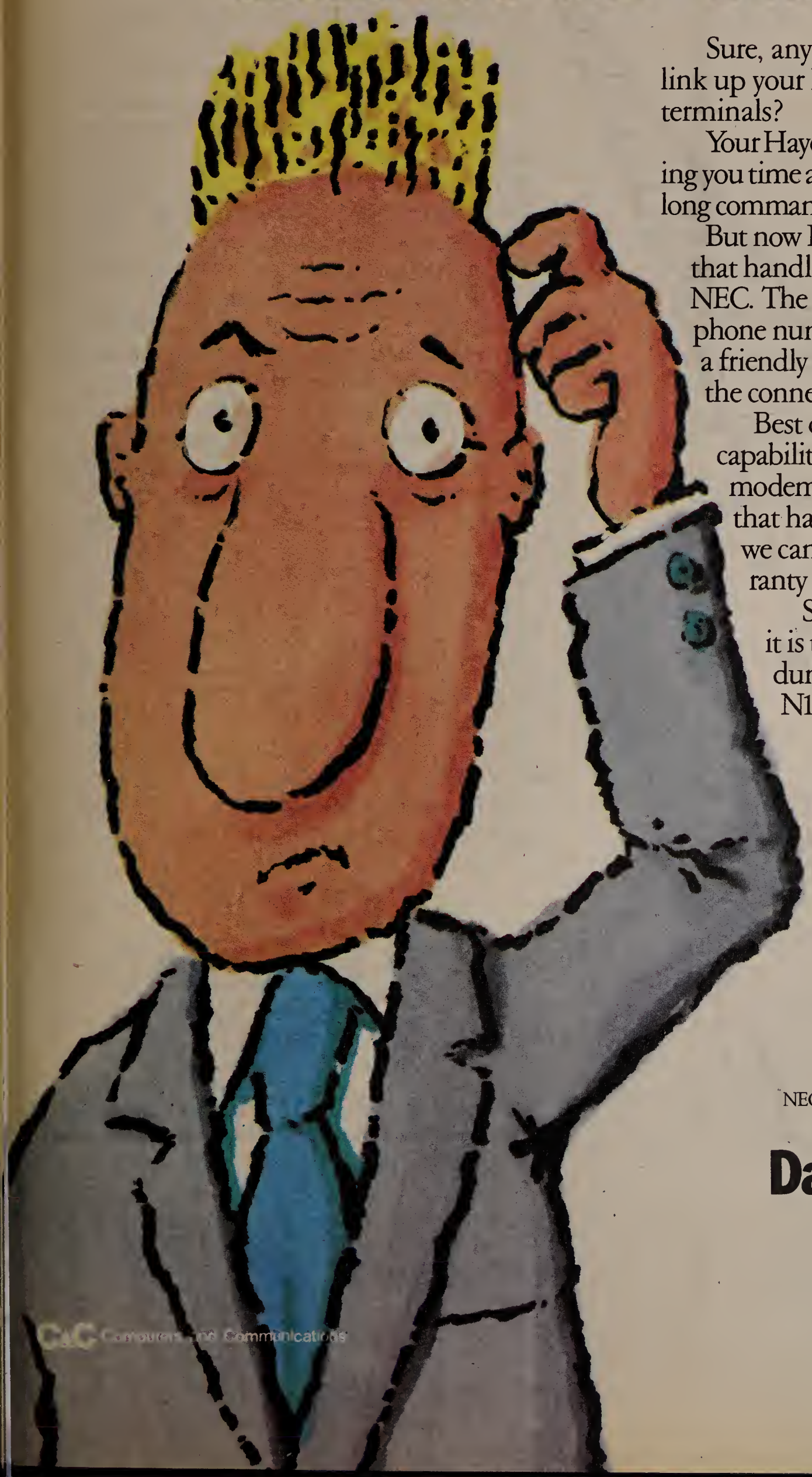
Libra: Buying used systems requires balancing knowledge and price. The already active used telephone system market is going to mushroom now that peace is being declared in the PBX pricing war.

This will mean more potential headaches for users, more places to shop, more options for prices, more sales reps to drive users to lunch and distractions and more opportunity for cosmic catastrophe.

The used system mart is a good opportunity for well-prepared users — those with the experience to know when and what to buy used.

Some used systems company is going to make a meteoric rise in the market by taking care of details for the buyers and making sure unwary users don't bargain-hunt themselves into a disaster.

Are your modems smart enough to talk to dumb terminals?



Sure, any Hayes-compatible modem can quickly link up your PC's, but what about your "dumb" terminals?

Your Hayes-compatible "smart" modem may be costing you time and aggravation as you laboriously type in long command sequences to access a mainframe.

But now NEC offers 1200 and 2400 bps modems that handle two auto-dialing protocols—Hayes and NEC. The NEC protocol can store up to 12 telephone numbers and logon sequences, and provides a friendly Help menu to assist you in making the connection.

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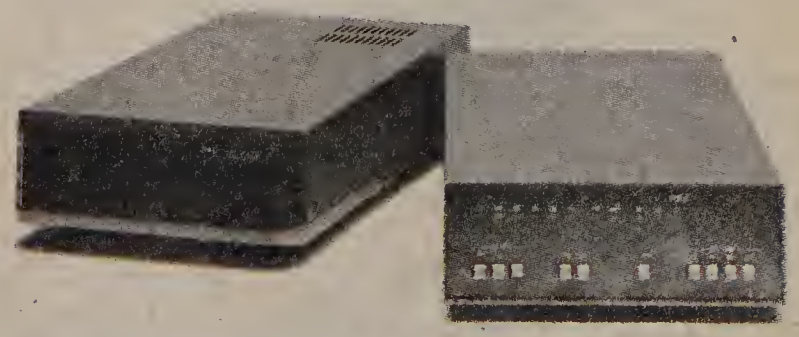
So give us a call and find out how easy it is to use our NEC auto-dialer with your dumb terminals. Find out about the NEC N1220/30HN and N2420/30HN modems. They outsmart the smart modems.



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Or 800-642-0666.
Call or write for a free brochure on the N1220/30 and N2420/30 modems.

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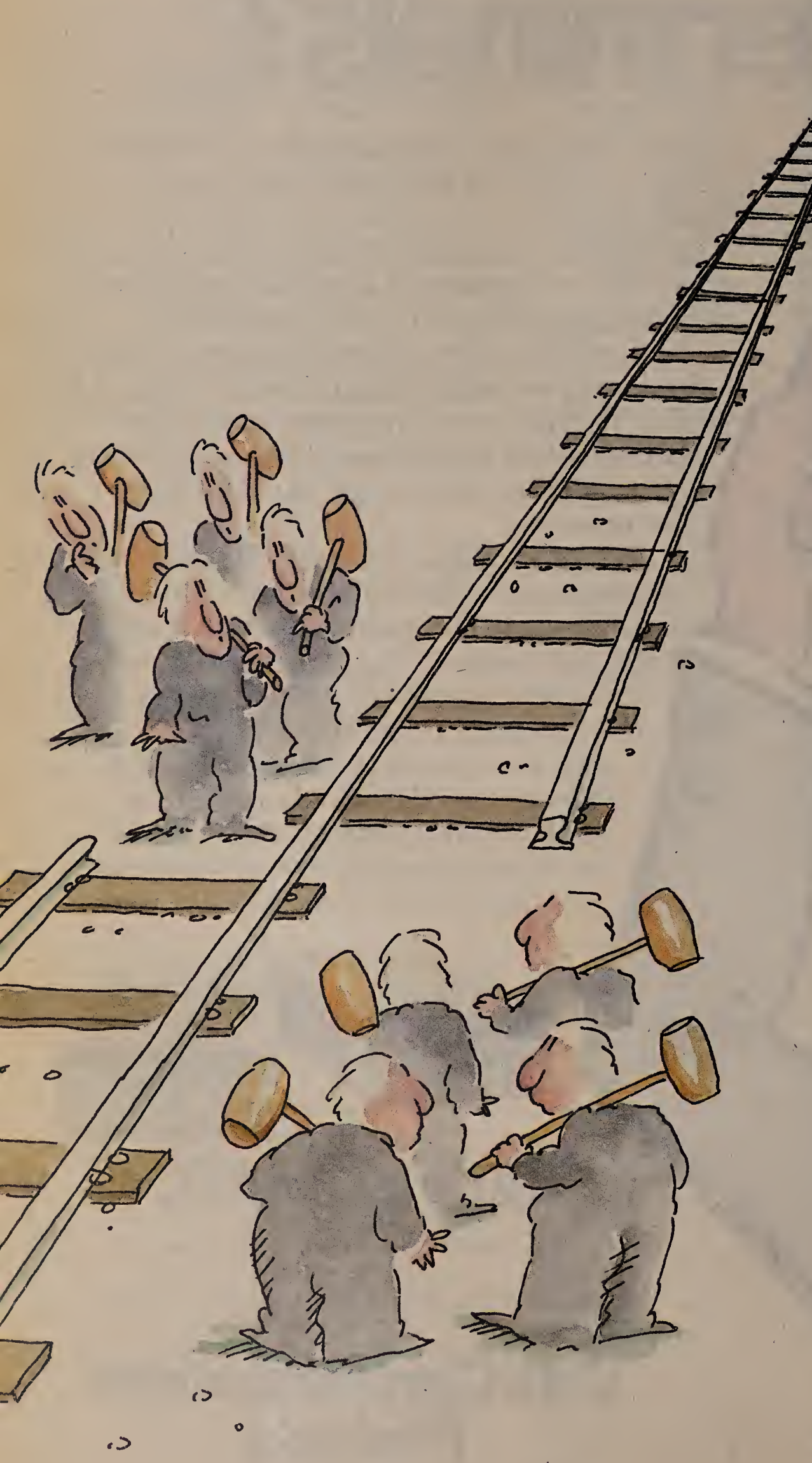

WHEN IT COMES TO BUILDING WIDE-AREA NETWORKS, THERE'S NO SUBSTITUTE FOR EXPERIENCE.

While any number of companies can offer to sell you a private wide-area network, one company can offer you 25 years of computer and communications experience along with it. BBN Communications.

Experience that includes designing and building the world's first packet-switching network for the U.S. government back in 1969. Since then, it has evolved into the world's largest wide-area network, the Defense Data Network, connecting over 30,000 users throughout the world.

But the U.S. Government isn't the only customer with tough networking problems that BBN has helped to solve. Numerous major corporations, among them Wang, Weyerhaeuser, and MasterCard, not to mention European giants like England's National Westminster Bank and Italy's largest corporation, ENI, have also found the answers they were looking for from us. Each came to BBN with a unique networking problem—from integrated voice/data transmission to electronic mail to credit authorization—and each came away with a unique networking solution.

If you're going to make a major commitment to a wide-area network vendor, only three things count. Experience, experience, and experience. In wide-area networking only one company delivers it all.

SHOULDN'T YOU BE TALKING TO BBN?

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